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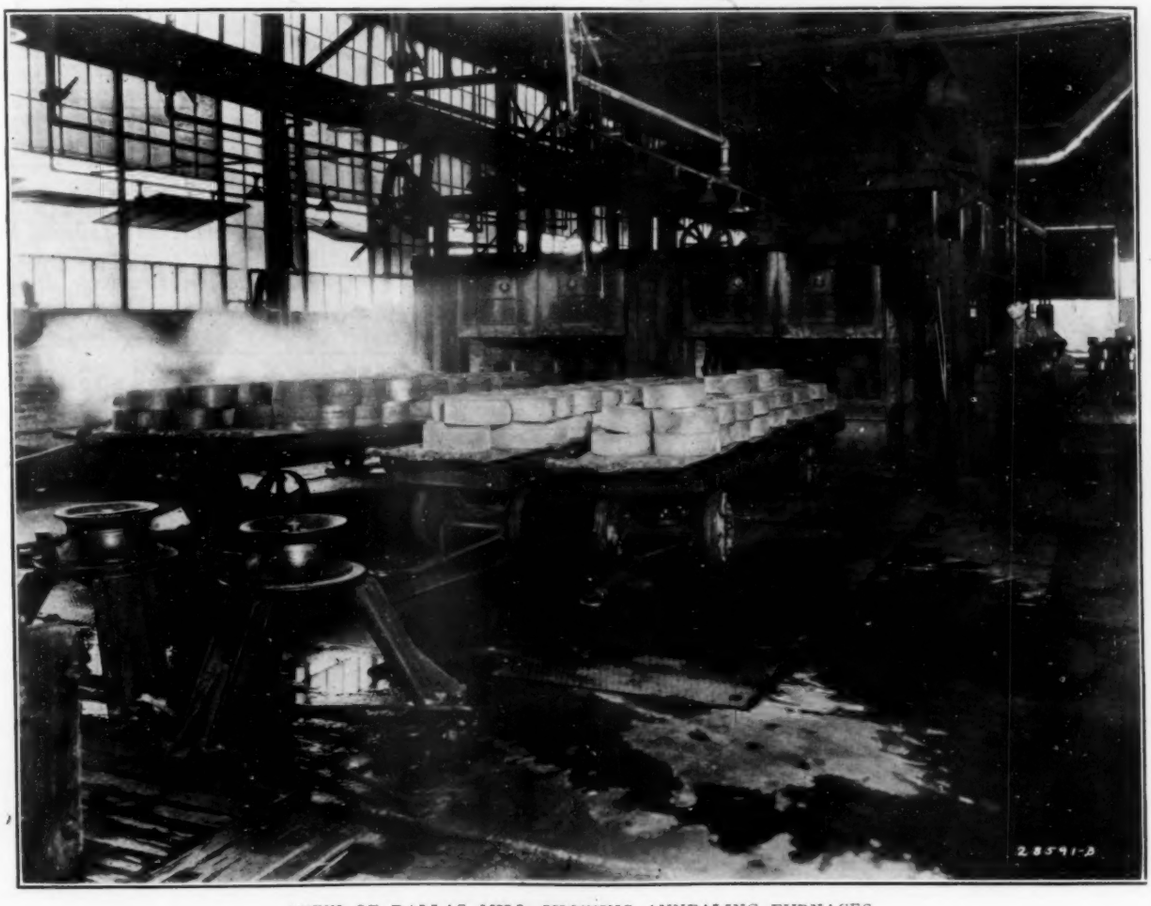
The Dallas Brass Rolling Mill

A Description of the Sheet Brass Rolling Mill of the Dallas Brass and Copper Company, Chicago, Ill.

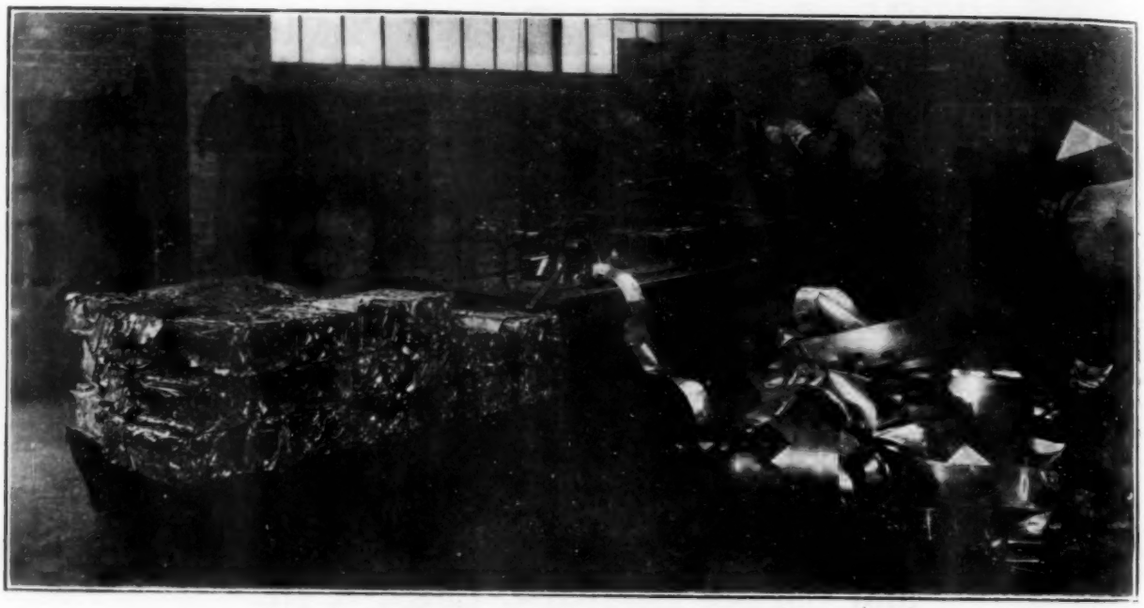
The Dallas Brass and Copper Company was organized and incorporated as A. C. Dallas and Son, January 31, 1908, with a capital of $10,000. By 1912 this company was rolling its own metal and in 1914 it had grown to a capitalization of $100,000. The growth continued by leaps and bounds amounting to $500,000 in 1917; $1,000,000 in 1920 and $1,300,000 in 1925.

Its present officers are C. D. Dallas, president and treasurer; G. M. Fritch assistant to the president; H. S. Ullman, vice-president and sales manager.

The new additional plant of the Dallas Company at 6600 Grand Avenue, Chicago, Ill., employs, on the average, about 100 men and has an operating capacity of about ten million pounds of sheet brass per year. This mill

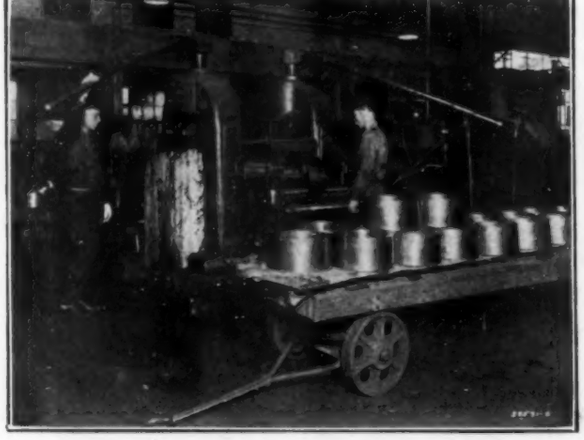


VIEW OF DALLAS MILL SHOWING ANNEALING FURNACES



CABBAGING MACHINE IN OPERATION

has two functions. One is to serve the Chicago and Middle Western trade and the other is to supply the main plant of this company, located at 820 Orleans Street, Chicago, with stock for re-rolling into very thin gauges, lock seam tubing and a general line of stamped parts such as eyelets, etc.

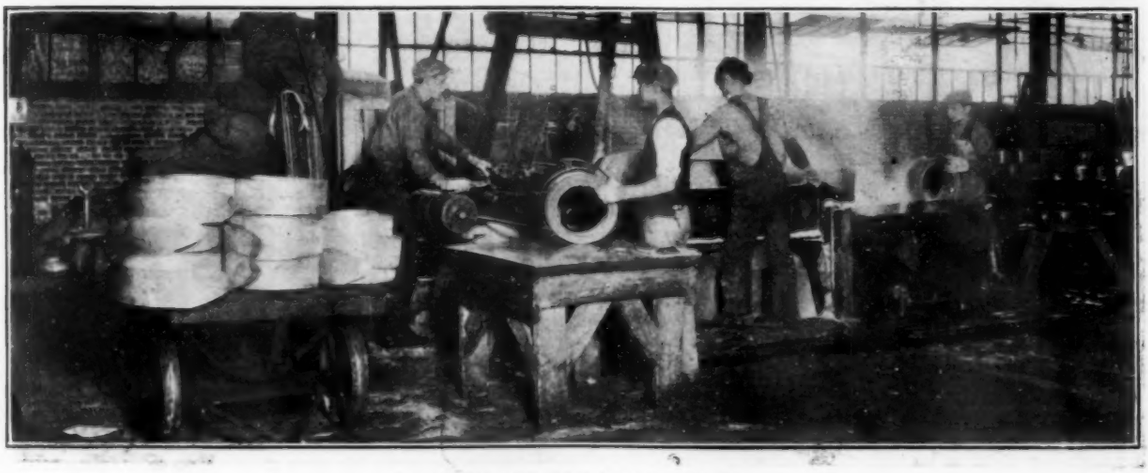


NO. 2 ROLL COILING METAL

The output of this company goes, in a general way, to four large industries; (1) automobiles; (2) electrical; (3) radio; (4) household appliances. The main plant at 820 Orleans Street acts as the distributor in these lines, while the new plant turns out only rolled metal in sheet or coiled form down to .010" in thickness. The Orleans Street plant takes much of this material and uses it for manufacturing purposes. In addition it turns out a line of thin metal not only in brass but in phosphor-bronze, copper, nickel-silver and zinc down to .001" in thickness. All brass produced by this company is specially adapted for deep drawing.

The raw material consisting of ingot copper and slab zinc is brought directly into the plant on a railroad siding on the property. Together with the company's own scrap it is melted in Ajax-Wyatt electric furnaces of the induction type and poured into bars. These bars range in width from 4½" to 15" with an average thickness of 1".

After cooling they are taken to large alligator shears



CLEANING AND PICKLING MACHINE

which remove the gate end far enough on the bar to insure sound castings. After gating, the bars, in sizes of ordinary mill lots, go to the breaking-down rolls and are reduced in gauge by several passes. They are then subjected to a soft anneal in Rockwell annealing furnaces.

After the soft anneal the metal is cooled by a water spray. In cold weather however, whenever convenient, lots of metal can be cooled by letting them stand in exposed or cold portions of the plant, thus saving water and aiding in the heating of the building.

After cooling, the metal is returned to the break-down roll for a second turn. It is then annealed again and cooled. The next step is for the bars to go through the overhauling machine in which the surface of each side is removed, thus eliminating casting defects, oxides, etc. They are then rolled on run-down rolls and coiled. This is followed by another anneal and cooling. A second and third reduction by the run-down roll may be necessary.

The metal then goes to the finishing rolls. Before each reduction on soft metal the brass is pickled thoroughly in the usual sulphuric acid pickle. The final anneal, as well as the anneal prior to the final one, is varied to meet the customers' requirements (dead soft, deep drawing, stamping, etc.).

After the final anneal, the bars are pickled, rinsed thoroughly in cold and hot water and run through heated sawdust to give a shiny dry surface to the metal. It is then finished by slitting to desired widths and cut into length as specified. It is inspected, packed in cases and shipped by truck or in carload lots.

Brass for Christmas

At this time of the year, all roads, both social and business, lead to Christmas. During the month of December particularly, they not only lead in that direction but they rush there with a speed possible only in the United States. Brass is no exception to the rule, and while Christmas might still be Christmas without the use of brass, it would not be quite the same. Trays, candlesticks, bowls, vases and personal ornaments, all play their part. The Christmas demand for brass articles is a not inconsiderable part of the brass industry.

PERSIAN BRASS EWER BASE WITH MODERN NECK. ABOUT 1200 A.D. SHOWN IN THE METROPOLITAN MUSEUM OF ART, NEW YORK

Ancient brasses were strictly utilitarian in character, comprising armor, shields, axes, etc. There were also, however, bowls and plates and even the sternest of these implements gave the workers an opportunity for decoration which almost no other medium could. The Greeks and Romans had brass and bronze kitchen utensils and lamps. Egyptian, Syrian, Persian and Mesopotamian brass consisted to a great extent of household articles, beautifully worked, enameled and in many cases even studded with stones, leaving out of consideration statuary which has existed since the earliest arts. The mediaeval brasses took in, besides household utilities, ornaments, trinkets and articles of personal adornment, such as brooches, rings, pins, needles, bodkins, thimbles and buckles. Whether or not the giving of Christmas gifts was such a tremendous affair as it is today, the custom was certainly growing, and the now rare brass pieces must have been part of the celebrations.

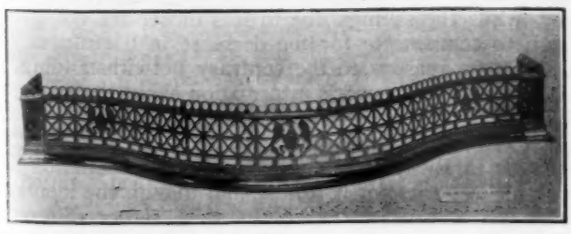
Christmas brasses as a specialty of course, do not begin to cover the whole range of articles manufactured from this alloy. They are gift pieces and essentially decorative in character, although they almost always serve some useful purpose. Small statuary for mentel decorations, fire-place sets, desk sets and ornamental paper weights, personal trinkets and adornments, candlesticks and trays, would perhaps cover the majority of the articles made for this season.

Oriental brasses and bronzes, Chinese, Japanese and Indian are noted for their unusual inlaid work and the extraordinarily fine design and workmanship. The workers of these countries have a rich inheritance from the early decorators of temples and idols.

British, French, Italian and German brassware should not be forgotten, as these stand high in the ranks of this art, as do Russian and Syrian brasses.

American brassware has been comparatively severe in character, sticking quite closely to the utilitarian, and even when more decorative in form has been quite simple This is probably due to the fact that the industry developed in New England and reflected the chracter of its people, the Puritans, living under severe conditions, fighting against great natural difficulties to earn a livelihood.

BRASS DESK SET MADE BY THE BENEDICT MANUFACTURING COMPANY



PIERCED BRASS FENDER. ABOUT 1800 A.D. SHOWN IN THE METROPOLITAN MUSEUM OF ART, NEW YORK

We may some day have an American brassware to compare with the foreign in appearance. It will, of course, develop along different lines, lines in keeping with our own national characteristics, which is as it should be. This is one of the little-trodden fields open to American manufacturers of brass and other metals.

What Do We Know About Copper-Nickel Alloys?

A Comparison of the Properties of Copper Base Alloys Containing Varying Quantities of Nickel*

Written for The Metal Industry by M. G. CORSON, Consulting Engineer
Formerly Research Metallurgist with The Union Carbide & Carbon Research Laboratories

Copper-nickel alloys, either binary or carrying small amounts of other additions, form the second important group of the rolling mill alloys. So, though of a much lesser economic significance than brasses, they undoubtedly are in good demand and more profitable than tin, aluminum and silicon bronzes.

Eight alloy compositions of the binary series are now manufactured and actually used. They are: (1) The 1.5% Ni alloy formed incidentally when nickel-bearing copper ores are smelted (mostly in Germany and Sweden), (2) 5% Ni alloy—used for driving bands on ordnance shells. (3) 15% Ni for bullet envelopes. (4) 20% Ni for coinage. (5) 25% Ni and 30% Ni for tubings. (7) 45% Ni for resistors and thermo-electric pyrometers. (8) 70% Ni for parts of chemical and other machinery. Some of these compositions bear no special names, but the 15% Ni alloy is called Benedict metal; the 45% has five names, namely, Constantan, Eureka, Advance, Ferry and Rheotan. Finally, the modified 70% Ni alloy is called Monel metal and also Corronil.

Copper-nickel alloys are by no means very young. Specimens are known to come from times long before our era. Coinage of copper-nickel compositions ranging from 15 to 35% in nickel was found in Central Asia and articles made of more complex alloys in China and in Siam, where the alloy was known as "packfong" or white copper. These alloys undoubtedly represented a natural product obtained from copper-nickel ores.

The Western civilization took little, if any, cognizance of the values of copper-nickel alloys up to the middle of the last century. At that time, copper-nickel coinage alloys came into use and very soon other compositions were recognized to have excellent properties as electric resistance material. This last application opened the gates for a scientific study of the whole binary series. Eventually the constitutional diagram was developed and the connection between certain electric properties and composition became established fairly correctly. In this way one can develop the graphs of Fig. 1.[1]

A. Electric resistivity (Feussner).
B. Its temperature factor (Feussner).
C. Thermo-electric power (Bash).
D. Thermal expansion factor (Johansson).

Other applications of copper-nickel alloys followed, though in a somewhat erratic way. No one subjected the alloys to any comparative study. The manufacturers simply "sized them up" as profit-bearing prospects and went into the game.

This might be illustrated by the protracted arguments about the values of the 1-1.5% Ni alloys and arsenical copper in the locomotive industry. The truth is that neither the nickel nor the arsenical alloy has any advantages and a 15% zinc brass, a 3% tin bronze or a 5% manganese copper are much superior to both. However, one concern had to sell its Ni bearing copper and others their arsenical product, so here is the whole story in a nutshell.

Aside from the resistance compositions which are definitely and thoroughly studied as to their electrical properties, all other copper-nickel alloys are used in connection

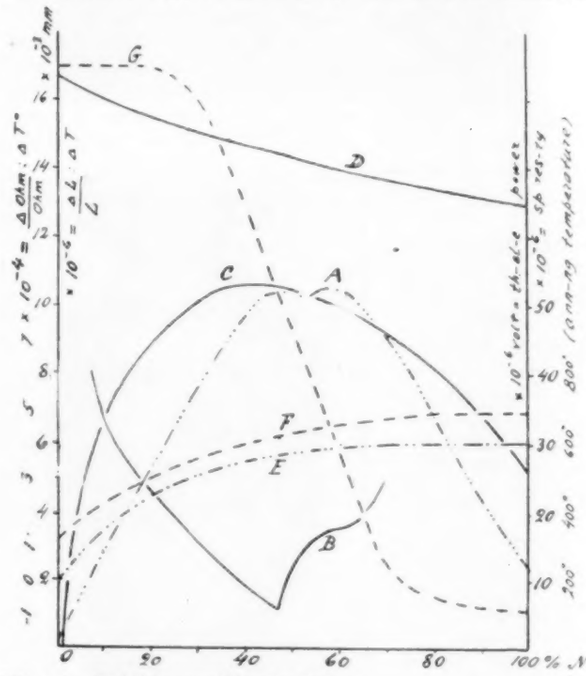


FIG. 1 A.—Resistivity graph in microhms.
B.—Thermal coefficient of resistivity.
C.—Thermoelectric power in microvolts per degree C.
D.—Thermal expansion coefficients.
E.—Annealing temperatures (incipient recrystallization).
F.—Annealing temperatures (complete recrystallization).
G.—Rate of oxidation (microns of scale per hour).

with their mechanical and chemical features. This calls, of course, for a complete picture of the general situation through the whole binary series. There is little reason for anyone to state that his particular composition represents the best combination of properties and price, unless he is prepared to prove that the extra price for more nickel than he uses is too great for the improvement obtained, while the savings due to less nickel are not great enough to compensate for the decrease in usefulness.

But all the reasons to the contrary notwithstanding, a complete lack of systematic information about the mechanical and chemical properties of the Cu-Ni series persists.

Some time ago (and quite a time to be sure) Prof. Kurnakov in Russia and Guillet in France examined the copper-nickel series for hardness, and though the identical Brinell test was used, the results were rather different. Guillet's alloys were always harder than the corresponding alloys of Kurnakov. The graph developed by the latter

* Read at the Birmingham meeting of the A. I. Ch. E., December 8, 1926, by permission of THE METAL INDUSTRY.

[1] Our graphs of electrical resistivity (A) and its temperature factor (B) deviate considerably from the orthodox presentations associated with the Cu-Ni series. They are, however, strictly true to Feussner's data. The usual smooth curves can be drawn only by using a rough scale and assuring any deviations of Feussner's experiments from the desirable theoretical run to represent errors of observation. The recent investigation by Chevenard (J. Inst. Met. 1926, Spring Meeting) seems to indicate a compound Cu-Ni to form in the Cu-Ni series and its presence may fairly well explain the slight depression at the top of our E. R. graph and the sharp angle in the temperature factor curve.

indicated clearly a maximum of hardness near the 50/50% atomic composition of the series; this came rather handy inasmuch as it could be used as a practical illustration of the theory of metallic solid solutions.

Most recently Isihara made sclerscopic tests upon small crucible-frozen and heat-treated samples of a few copper-nickel alloys and came to the same type of conclusions. An interesting feature of the graphs by Isihara is the figure of 9 Scler. for annealed copper (obtained by extrapolation). In a general way, 7 Scler. is the maximum for annealed copper.

But the graphs of hardness taken alone are practically meaningless. The features of tensile strength, yield point, fatigue and impact resistance are the actually important ones.

Data concerning the strength of copper-nickel alloys were frequently stated in the literature supplied by the manufacturers. These, however, are always woefully inadequate and inconsistent. Statements like this:—from 60,000 to 80,000 lbs. strength as annealed, or 100,000—140,000 as cold drawn—are entirely meaningless, just as much as: 50-70,000 lbs. as hot forged. An alloy of a given composition and a definite history is a definite substance which, in its extreme states, i.e., the "cold worked" and "annealed" is identified by features of a very narrow range of variations.

Except for exceedingly heavy or very fine sections (i.e. a 3"d. shaft and a 1/32"d. wire), the values of tensile strength should not differ by more than 5% at any rate.

With this in mind one has to develop a general viewpoint founded on facts and permitting one to establish in each concrete case the inherent strength values. This requires a short excursion in the realm of the monophase "alpha" copper alloys in general.

Copper is a very ductile metal. This means, in fact, that unless complications arise (and they are quite easily avoidable) one cannot cold work a piece of copper so as to bring its ductility down to zero. Careful passes even when totaling as much as 90% reduction will not leave the metal with less than 5% elongation in 2". At this moment or even somewhat before it, a testpiece with dimensions ranging from ¼" to 1" will show about 54,000 ± 2,000 lbs. ult. strength.

On proper annealing the same piece of copper will have its ductility raised to 50-60% elongation in 2", the upper figure being the far more frequent. Corresponding to this ductility we find a strength of 31,500 ± 1,500 lbs. This relationship of strength values is identifying for the commercially pure **multigranular** copper.

The figure of 60% elongation is by no means the maximum for copper. It is due exclusively to tiny contaminations with oxygen and gas inclusions. A de-oxidation—one that leaves about .05% of the de-oxidizer in solid solution—brings this figure to 70-75% and this ductility is a real identification mark for copper.

It was the experience of the author that no **alpha** alloy of copper, if compounded with a moderate care and rationally annealed will show much less than these 70% of elongation. A standard brass with 30% zinc, a (hardly used) rolled 10% tin bronze, an 8% aluminum bronze, a 4% silicon copper—all will show 70% ± 5% elongation in 2", and this must be considered an identifying feature of all alpha alloys of **copper** of a limited range.

On the other hand, the same alloys **may** be cold rolled so as to leave no more than 2% elongation in 2" by the use of unduly heavy passes. If carefully rolled, however, they all will retain 5% ductility even after 80% reduction in cold rolling. No increase in strength is gained by a stiffer rolling. On the contrary, leaving more than 5% elongation in the alloy leads to definitely lower strengths. Therefore 60-70% elongation for the annealed and 5% for the cold rolled alloys might be safely accepted as the counterparts of the inherent strength values for all alpha alloys with a large but still a limited range.

With alloys of the copper-nickel series, conditions are somewhat different. There is no reason whatsoever to accept a definite saturation point anywhere in the series. Thus, with the facts on hand that the 20% cupro-nickel is as ductile as copper, while a good sample of "Monel" compares in ductility with nickel we may expect the ductilities in the whole series to oscillate closely within the range of 60-70% in 2" (for copper) to 50% (for nickel).

Scanning the ductility figures incidentally mentioned for various copper-nickel alloys we find the figure of 50% quite frequent for the annealed state. With this figure in mind and allowing ± 2,000 lbs. of discrepancy between

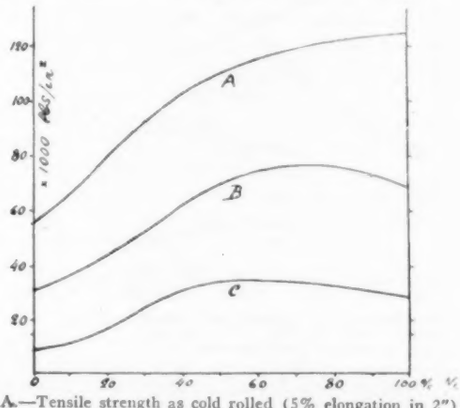


FIG. 2. A.—Tensile strength as cold rolled (5% elongation in 2").
B.—Tensile strength as thoroughly annealed (50-60% elongation).
C.—Endurance limit.

tensile strength values corresponding to ductility variations of ± 5%, we can tabulate, compare and plot the results of various tensile tests. In the face of the obvious inadequacy of literature data, the author was compelled to make a few melts and bring the alloys by homogenizing, working and annealing to the limiting ductilities of 50-60%

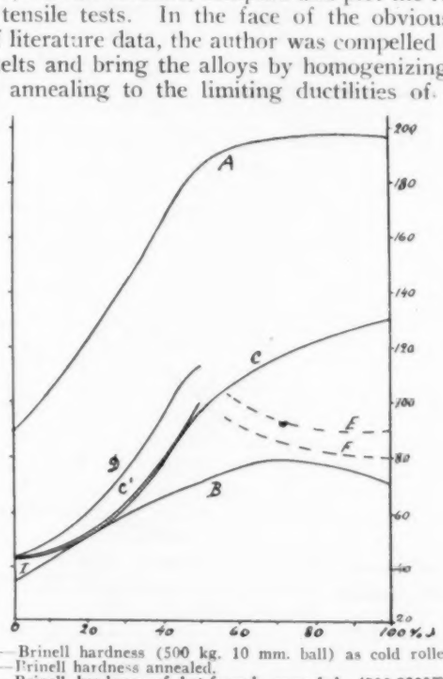


FIG. 3 A.—Brinell hardness (500 kg. 10 mm. ball) as cold rolled.
B.—Brinell hardness annealed.
C.—Brinell hardness of hot-forged, annealed, (800-900°F.) and air cooled alloys made in graphite crucibles.
C_1—Brinell hardness of same specimens (up to 50% Ni as cast, annealed and furnace cooled).
D.—Brinell hardness of same specimens as chill cast.
E.—Brinell hardness of high nickel alloys made in magnesia lined crucibles but in contact with carbon-monoxide (chill cast).
F.—Brinell hardness of same specimens as annealed at 900° F. and furnace cooled.
I.—Hardening of high copper alloys due to oxide inclusions.

and 5% respectively. On the basis of the data compiled one obtains the graphs A and B of Figure 2 for the strengths in the series as cold rolled and as annealed. Graph C of the same figure shows the fatigue limits for the series. It is interesting to note that in the cold rolled state no alloy is stronger than nickel itself, and also that the maximum inherent strength in the pure binary series belongs to a 75% Ni composition (and not to the 50-50 alloy as ought to be according to the over simplified theory of solid solutions). Finally we note that the fatigue limit of the annealed alloys shows a very flat maximum from 50 to 70% nickel.

The corresponding figures of the Brinell hardness can

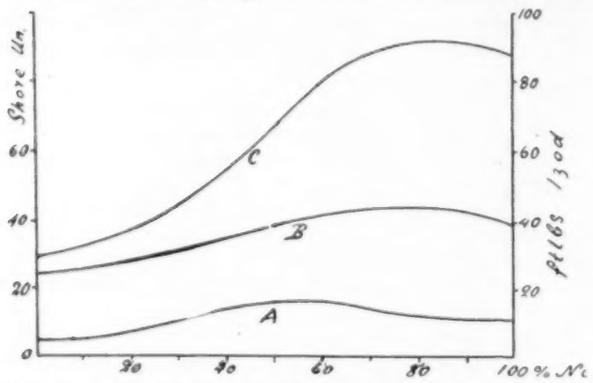


FIG. 4 A.—Shore hardness of wrought and annealed alloys.
B.—Shore hardness of cold worked alloys.
C.—Impact resistance (Izod figures).

be obtained from graphs A and B, Figure 3; those of the scleroscopic hardness from graphs A and B, Figure 4. Finally, Izod impact data are reproduced in graph C, Figure 4.

At this point we come to the C and D graphs of the Brinell hardness of Figure 3. One sees that on one occasion a hardness of 114 Brinell was recorded for a chill cast 50/50 alloy as made in a graphite crucible. This hardness fell off on annealing, to 96, which is still far above the inherent hardness of the same alloy as shown in curve B. (71 Brinell). The same discrepancy will be

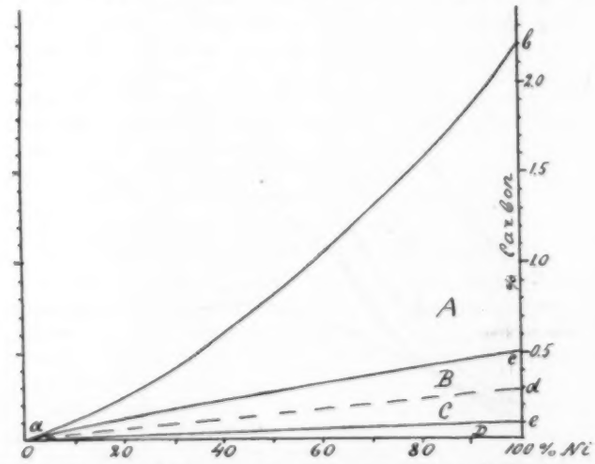


FIG. 5—Hypothetical diagram of the ternary system copper-nickel-carbon.
A.—Region of primary graphite separation.
B.—Region of secondary graphite separation.
C.—Region of ultra microscopical carbide precipitation.
D.—Region of stable solid solutions.

noticed in any hardness records of alloys obtained under industrial conditions. Divergences of this kind are encountered as well in the tensile strength datas. This explains the indefiniteness of strength values encountered in the literature and accompanied by ductility figures of 30-35% only. Those responsible for these data ought to add "as made under the following conditions—."

The fact is that very rarely does a copper-nickel alloy of the trade represent a really binary combination or even a perfect solid solution. Leaving aside those incidental or deliberate additions like iron and manganese we find contaminations by oxygen, silicon and carbon; possibly also nitrogen. Only when the alloy is made upon a basic bottom out of contact with furnace gases, when the melting is quick and done preferably under a layer of an inert flux, will the minimum hardness and maximum ductility figures be reached.

Those alloys as used for plotting out graphs were made in magnesia lined crucibles and de-oxidized with 0.2% Mg using no stricter precautions. Under ideal conditions the graph B of Fig. 3 might run 3-5 Brinell units lower. Even if the alloys are made in clay crucible they will get contaminated by 0.3% silicon approximately (in the high nickel alloys). Finally, if the melting is in a graphite-clay pot of contamination with carbon cannot be avoided.

And that is where the actual story begins. Every copper-nickel alloy of the trade represents in a general way a ternary alloy of the Cu-Ni-C system. In this latter the conditions may be represented hypothetically as in Fig. 5.

Near the eutectic point of the nickel-carbon series (1310° C.) the melt may contain about 22% carbon. Curve c-a shows the possible run of the eutectical line in the ternary system Cu-Ni-C.

Alloys containing as much carbon as corresponds to the curve c-a must be entirely worthless from the viewpoint of the rolling mill. The excess carbon will be present partly as carbide of nickel, partly as graphite. The alloy will be hard and brittle (biscuit structure).

Near the point of its complete solidification nickel may probably retain as much as 0.5% carbon in solid solution. Curve c-a shows the drop of this maximum solid solubility with the increase in the concentration of copper. Alloys containing carbon in amounts not exceeding those corresponding to this curve must be fully and perfectly **hot workable.**

At the room temperature nickel may probably retain in solid solution not over 0.1% carbon. The curve c-a shows how this figure may drop with the increase in the concentration of copper. Alloys lower in carbon than corresponds to this curve c-a will cold roll and draw perfectly.

The excess of carbon which cannot be retained by the alloy in solid solution precipitates as carbide which dissociates extensively into graphite and nickel. The more carbon is present the more graphite is formed. At lower contents of carbon, however, plenty of carbide remains intact (below the curve d-a).

This carbide tends to remain submicrosopically dispersed in the grains of the alloy and hardens them considerably. That is why Curve C in Fig. 3 shows the Brinell hardness of alloys made in a graphite crucible, hot forged and furnace cooled to be much higher than of those made in magnesia crucibles under much better conditions (curve B). It explains also why alloys made in graphite pots and chill case (curve D) are harder than those annealed at 900° and quenched (curve C' practically coinciding with curve C). It explains as well why a hot rolled nickel with nearly the same ductility (40-46%) shows 93,000 lbs. strength at .26% carbon and only 69,000 lbs. at .08% of carbon. The presence of .18% additional carbon in solid solution could never prove a satisfactory explanation for the 24,000 lbs. additional strength. It would be, however, quite plausible to explain it by the presence of, say, 1.0% Ni_3C in the shape of key crystals or skeletons.

The presence of carbide in its various stages of growth might explain, also, the frequent failures of bars of Constantan or Advance metal in wire drawing. Crystals containing the reinforcing keys cannot draw easily, even if the latter coalesce considerably by annealing and slow cooling at the grain boundaries.

Thompson describing a failure of the 20% nickel alloy upon annealing (J. S. Ch. Ind. 38,130T) believes the coalescent rims of the grains to contain graphite, but it is most probably carbide.

To conclude: carbon must be either kept absent or compelled to stay in solid solution by quenching from 900-1000° F. before the bars are drawn to wire.

Our description of the mechanical features of the Cu-Ni series we will conclude with the thermal side of the annealing operation. From the author's own experiments (alloys with 60% reduction in cold work) and literature data the curves E and F of Fig. 1 were plotted to show the temperatures of the incipient and the finished anneal. The margins between these two graphs are larger for the two pure metals and smaller for the central compositions, particularly the 40% nickel alloy.

Alloys containing carbon anneal in two steps; the first, corresponding to the recrystallization and the second, to the dissolution of the intragranular precipitate of carbide.

CORROSION RESISTANCE

There is no doubt that with the exception of the 43-47% Ni alloys (Constantan) all others are used mainly because they really are or are believed to be more resistant to certain specific types of corrosion at least. Among all compositions possible those of Monel metal (68% Ni, 28% Cu + 4% of Mn + Fe + Si + C) and Corronil (70% Ni, 4% Mn, 1% Fe, 25% Cu, 0.3% Si + C) are claimed to be by far the best.

It is entirely beyond the scope of this paper to compare these two alloys and copper-nickels in general with other alloys in the field. We grant accordingly, that the corrosion resistant properties of the Cu-Ni series are a definite fact. This does not, however, exclude the question as to which of the plain binary and possible ternary alloys are actually more suitable in the general way and in some specific cases.

Some thirty odd years ago when Ambrose Monel first conceived the lucky idea of turning a complex ore into a complex metal avoiding in this way a number of more tedious operations. The "natural" alloy had an undeniable advantage of cheapness. It was cheaper than even the nickel included. An artificial alloy with 60% nickel would probably cost more in those times.

And the mechanical properties of the "natural" alloy seemed to be really extraordinary. At the time when only the properties of Constantan were known, when the binary 70% Ni alloy was supposed to be weaker than Constantan (because the latter is located at the theoretical peak of the hardening effect of solid solubility) the mechanical features alone were undoubtedly in favor of Monel metal. As a matter of fact, however, the 70% Ni alloy is much nearer the peak, see Figs. 2 and 3), i.e., the spot where a little of nickel plus or minus has no effect. This latter feature permits the foreign metals (Fe, Mn) to be of much more consequence in addition to the general influence of carbon. For this reason, its English cousin, the synthetic "Corronil" alloy is neither less strong nor less reliable.

The price of both alloys is well—exactly at the point where it ought to be if made in the foundry from good nickel and good copper and the customer gets no advantage of saving due to the use of the "natural" alloy.

Under these conditions every user of Monel or the like has the right to raise the question as to whether Monel is actually so much chemically superior to a 50/50 or 60/40 alloy, that the extra price for the extra nickel is fully compensated for.

Each corrosive attack represents either a direct combination or an ionic substitution. The first can be reduced as far as the practical side is involved to oxidation or sulphurization or both, and expresses itself in a deep or shallow tarnish. The second means really a solution in acids resulting in a general reduction of thickness (not too important) and local corrision pitting and perforation of much larger sequence

Each of the two types of attack is built up of chains of various independent and interdependent phenomena. Most of them are only vaguely felt today. In the case of tarnishing we are sure of three elements, namely, the heat of formation, the hardness of the metal and the purely physical adhesion between the metal and the first layers of the formed tarnish. In the case of copper and nickel it amounts to the following situation:

Nickel oxidizes more easily but deters the oxide layer from growing loose. It forms, therefore, a protective film which copper has no power to form.

Nickel sulfidizes less easily than copper and is much harder. Therefore, even the initial rate of sulphurization is lower for nickel than for copper.

In addition—a thin film of oxide or sulfide upon the surface of nickel makes it only dull. The same on the surface of copper renders the metal unmistakably dirty.

Data of direct experiments with the rate of oxidation of copper-nickel alloys, one set of which is reproduced in curve G Fig. 1 (by Pilling and Bedworth), show convincingly that the resistance to high temperature oxidation increases definitely up to the pure nickel metal. It is, however, almost exactly at the Monel metal composition, that a further increase in the content of nickel affects the costs of the alloy out of comparison with the additional protective action.

No analogous experiments in sulfurization were made so far, but it seems certain that Monel metal would prove much superior to the 50% nickel alloy and only slightly inferior to pure nickel. In certain cases, for instance, in solutions of sulfides, carbonates and hydroxides, one has to cope with the peptizing action of the salt upon the film of oxide or sulfide as formed in some other way. In this direction it was found that the more nickel is in the alloy the less active the peptizing and the more reliable the protective action of the initial film. Monel metal is by no means the best alloy in the series, but the advantages obtainable by using a material higher in nickel—seldom warrant the extra cost.

Turning now to the second type of corrosion as caused by contact with acid substances containing hydrogen ions, we find the following situation. Copper in itself is highly electro-negative to hydrogen and while its characteristic potential of dissolution may vary considerably according to temperature, pressure and concentration of the attacking acid, it always remains much too noble to be directly dissolved by an acid substance. The only way in which this attack may take place, consists either in an immediate oxidation of the first traces of hydrogen developed or (and this is much more logical), in a preliminary oxidation of copper. No acid of a fully stable type will attack pure copper in the total absence of all agents apt to combine with copper directly. Even impure copper—one which carries a tiny network of oxides or sulfides between its grains, and which will deteriorate by the weakening of the intergranular substance, will not be actually corroded.

An addition of nickel does not seriously affect the noble electrochemical behavior of copper. Up to the com-

position of Monel and even further, the potential does not grow by more than .033 volts, and the alloys of this range retain fully the properties of an electro-negative metal. In the absence of an oxidizing agency corrosion will be practically nil—only the intergranular impurities being attacked.

When metals or alloys of a nearly identical electro-chemical position are called upon to resist an acid in the presence of an oxidizer the relative hardness becomes an important factor in deciding the issue just as well as the ability of the atoms of the alloy to keep the first film of oxide molecules in a close proximity, so forming a layer—not exactly protective—but strong enough to slow down the corrosion velocity.

Experiments by Irmann (Met. & Erz. 1917) show (in a somewhat crude manner) that this is the general tendency in the copper-nickel series. An increased content of nickel means an increased hardness and a closer adherence of the film, the speed of corrosion in a hot 63% sulfuric acid dropping by about 80% from copper to a 50/50 alloy. From this composition and up to pure nickel the electro-chemical influences become stronger and the corrodibility increases.

Irmann's data form the only comparative test of any value encountered in the technical literature, and it must be noted that they do not indicate any advantages of Monel metal before the much cheaper 50% Ni alloy.

Another set of experiments is related by Barclay (J. Soc. Glass Techn. V8). In these tests strips of **hard rolled** alloys were kept for a protracted time (about 25 days) in closed bottles filled with various liquids—mostly solutions of acids. Aside from the fact that tests of this kind or refinitely inadequate, they have shown that hardly a difference exists in the behavior of a 30% Ni cupro-nickel, a 47% Ni "Ferry" and a complex 70% Ni Corronil alloy under the attack **of all organic acids** and of sulfuric acid of 1% and 60% concentration. Corronil was found to be slightly better in 1% nitric acid (not enough so to pay for the extra cost) and considerably better in 1% and 10% hydrochloric acid.

The reader must be warned that the value of the mentioned corrosion tests is by no means large enough to warrant any conclusion. Monel metal and Corronil so frequently used in contact with the solutions of sulfuric and organic acids **may** be better than 30% cupro-nickel and better than the 50% Ni alloy, better than any other alloy with a lower nickel content and a lower price, **but this has never been proved.**

CONCLUSIONS

1. Pure Cu-Ni alloys can be made only upon a basic bottom and when fully protected from the action of oxygen and carbon.
2. For the purest alloys the highest strength and hardness corresponds to the 70% nickel alloy.
3. In the presence of carbon metallic nickel becomes the strongest and hardest member of the series.
4. All alloys from about 50% to 75% nickel are essentially similar as to their mechanical reliability and all of them can be annealed at similar temperatures as well.
5. Increased additions of nickel to copper are most likely apt slowly to decrease the speed of corrosion by acids in the presence of oxidizers.
6. There are no positive proofs that the expensive Monel metal or Corronil cannot be replaced by any cheaper composition equally or better withstanding the acid attack.
7. Nickel undoubtedly resists better than copper any direct combination attack (oxidizing, sulfurizing, etc.) and an addition of nickel to copper tends to exert a definite protective influence in these cases.
8. This protective influence begins to show up only at a considerable distance from copper and slows down only very near to the composition of Monel metal. In this direction Monel metal is undoubtedly the cheapest copper-nickel composition in reference to the rate of the increased protection compared to the increased cost.

Aluminum Solders

Q.—As we are regular subscribers to your magazine we are taking this means in asking for information as to the making of aluminum solder that can be used with a hot soldering iron or lead burning torch. If you have this information on hand we would be pleased to have you write us.

A.—There are possibly 100 formulae on the market for aluminum solders; most of them patented.

A report of an investigation on aluminum solder carried on by the Bureau of Standards, with view of discovering the best mixture, can be found in the Metal Industry, for November, 1918, page 500.

If you do not have a copy of this issue, it should be found in the public library in your city. This article should give you all the information you desire.—W. J. REARDON.

Brazing Solder

Q.—We are interest in making brazing solders as per sample herewith. This tests 50% copper and 50% zinc, and we are in a position to grind it, but want to know what to do to have this mixture brittle. The fact is, that when we pour this mixture into slab, the slab is not brittle but malleable.

A.—The method used in making brazing solder is to cast in slab about 8 in. x 12 in. x ¾ in., place under a power hammer of any kind and pound out thin. It gets very brittle and is easily ground up fine. The method of grading is to sieve through different mesh riddles. As you know the process is rather slow but it is the only method we know of.—W. J. REARDON.

Chilled Bronze

Q.—We have inquiries for chilled bronze gears like those used on Class B army trucks, made of S.A.E. No. 65 phosphor bronze mix.

The writer is of the opinion that there would be a great deal of grief experienced in starting the manufacture of bronze gears, especially those chilled on three faces. We would also like to know what good it does to chill the outside diameter of the gear if you leave it blank; in other words, if you do not chill the shape of the teeth.

We presume the cause for chilling these gears is to make them machine more easily, as our experience leads us to believe that the chill will not make the casting any harder, or give any better wearing service. This, of course, we know is true with cast iron and steel, but have not found it the case in non-ferrous metals.

A.—The idea of chilling bronze gear blanks is to assure uniformity of the mixture, as tin has a tendency to segregate in cooling and in castings of the sections of a gear blank it is possible to have 11% tin in some parts, 15% tin in others and 7% in others. The section nearest the gate will be found soft as it stays liquid longer than the balance of the casting and this section will be found weak and may give trouble in service, breaking under heavy load.

This is the main reason for chilling, to set the casting as soon as possible and prevent segregation.—W. J. REARDON.

The Application of Technical Control to the Metal Rolling Mill

How the Scovill Manufacturing Company Uses the Laboratory to Control the Plant.* Conclusion.

By WILLIAM B. PRICE

Chief Chemist and Metallurgist, Scovill Manufacturing Company, Waterbury, Conn.

THE SELECTION OF THE PROPER METAL FOR THE JOB

For some purposes a fine grained metal is desired, for others a coarse grained structure is better. Plate VII illustrates the appearance of two reflector shells—one made from a rather fine grained metal and the other from a coarse grained. Representative micrographs are shown above each. It is very evident that rough shells will prove an expensive proposition when it comes to polishing the inside for reflector purposes. By studying other properties of the metal, such as tensile strength, Brinell hardness, etc., in their relation to annealing and cold working, the laboratory is in a position to interpret our customers' requirements, which are very often stated in terms of physical and chemical tests.

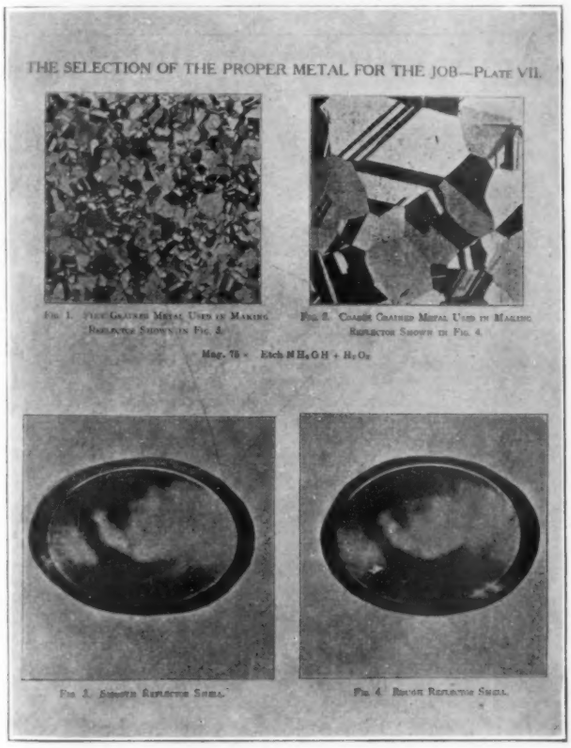


PLATE 7. JUDGING THE RIGHT METAL BY PHOTOMICROGRAPHS

HOW THE MICROSCOPE CAN BE AN AID IN THE MANUFACTURING DEPARTMENT

By examining a manufactured article under the microscope, one can sometimes tell how it had been made; or, if the article is defective, there often exists an indication as to the cause of the defect. During the early part of the war, the officer in charge of the English inspection service occasionally brought into the laboratory some defective 18 pound British shells for microscopic examination. Typical micrographs of these shells are shown in Plate VIII. Metal which had been folded in, causing a so-called annular ring, is shown in Fig. 1. A large crack in the annular ring, resulting from over-annealing and improper heading, is illustrated in Figs. 2 and 3.

PLATE 8. MICROGRAPHS SHOW DEFECTIVE METAL

Often articles will fail in subsequent manufacturing operations due to conditions that are not in harmony with the condition of the metal. On Plate IX are shown some cartridge shells that cracked in the tapering operation. Upon examination under a microscope Fig. 1 shows the surface structure of a burst shell, and the long dark streaks indicate local strain. A transverse cross-section of one of the shells is shown in Fig. 2. This shell had not been fired, but it was practically broken to begin with. Slight changes in the operations would remedy any trouble of this sort. Frequently in cases of this kind the metal is spoken of as defective when it is entirely suitable for the purpose.

* A lecture delivered before the Rotary, Kiwanis and Lion's Clubs, Waterbury, Conn., during the past year. Part 1 was published in our issue of November, 1926.

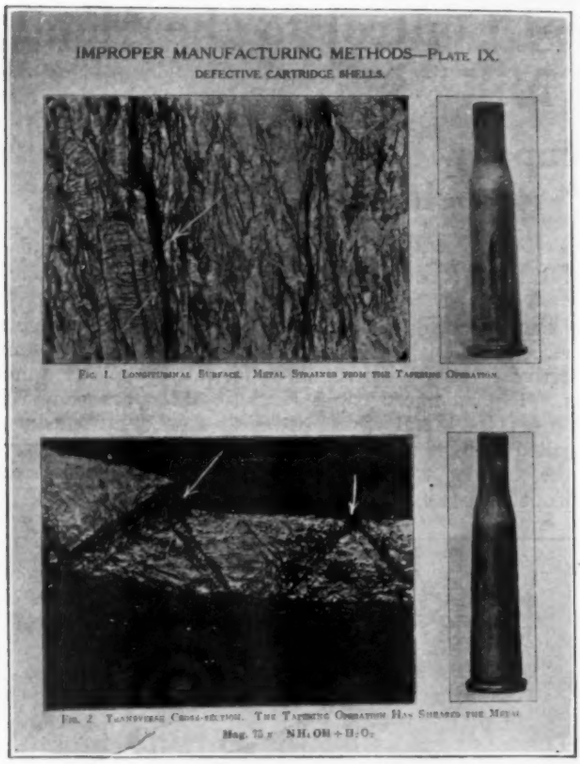


PLATE 9. MICROGRAPHS OF DEFECTIVE SHELLS

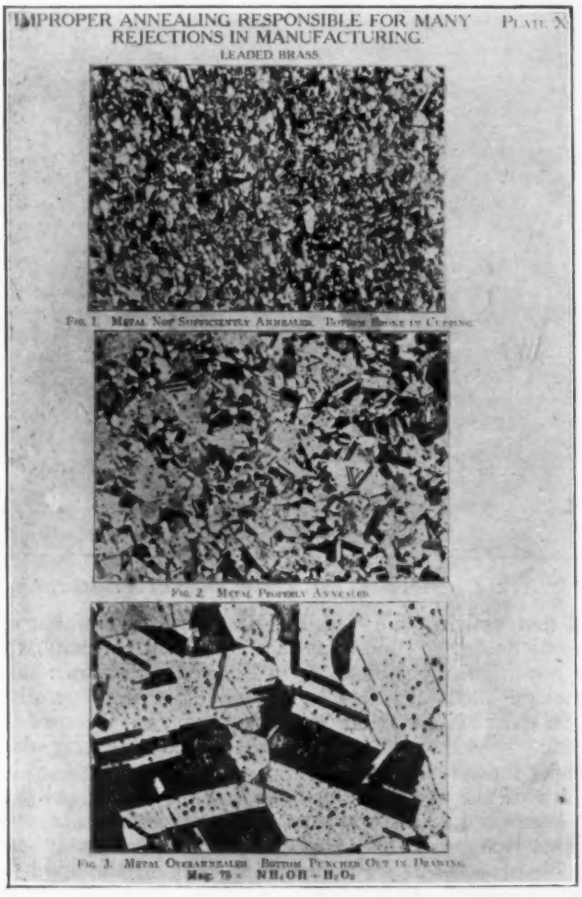


PLATE 10. MICROGRAPHS SHOWING IMPROPER ANNEALING

Improper annealing is the cause of considerable loss in manufacturing. When metal is not completely softened in the annealing operation and an attempt is made to draw it up into a cup, the bottom is apt to be pushed out. Over-heating the metal may also cause enough deterioration to spoil it. The structure of two kinds of bad shells are shown in Plate X, Figs. 1 and 3. You will recognize the hard, partially annealed structure in Fig. 1, while Fig. 3 has the characteristic over-size crystals. Fig. 2 illustrates the structure resulting when metal is properly annealed

Metallography is sometimes helpful in explaining the whys and wherefores of a mill schedule. The following experiment will illustrate:

Three samples of metal were annealed at 550°, 650° and 750°C. whose structures are shown in Plate XI, Figs. 1, 4 and 7. You will note the variation in grain size.

PLATE 11. EFFECT OF VARIOUS ANNEALS

These samples were then rolled 4 numbers hard, as illustrated in Figs. 2, 5 and 8. These were then all annealed at 450°C., as shown in Figs. 3, 6 and 9. Please note that Fig. 3 has a much finer crystalline structure than Fig. 9 although they had both received the same finishing anneal. This indicates that in order to obtain a very fine structure it is necessary that the preceding anneal be correspondingly low, otherwise a non-uniform structure will result.

In Plate XII is shown the microstructure of Muntz metal, the different figures illustrating cast structure, hot piercing, annealed, hard drawn and the structure of finished condenser tubes.

In Plate XIII the different figures from 1 to 5 illustrate the cast structure, annealed and rolled, dead soft anneal, hard drawn and fine grain finished condenser tube. All the micrographs in this article have been taken at a magnification of 75 diameters.

Plate XIV illustrates the advantages of micrographs taken at high magnifications in resolving details of a

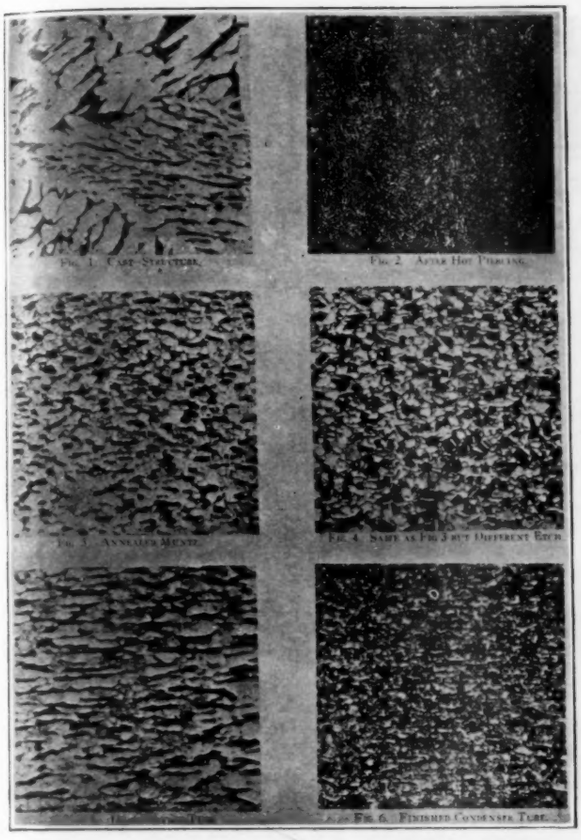


PLATE 12. MICROSTRUCTURE OF MUNTZ METAL

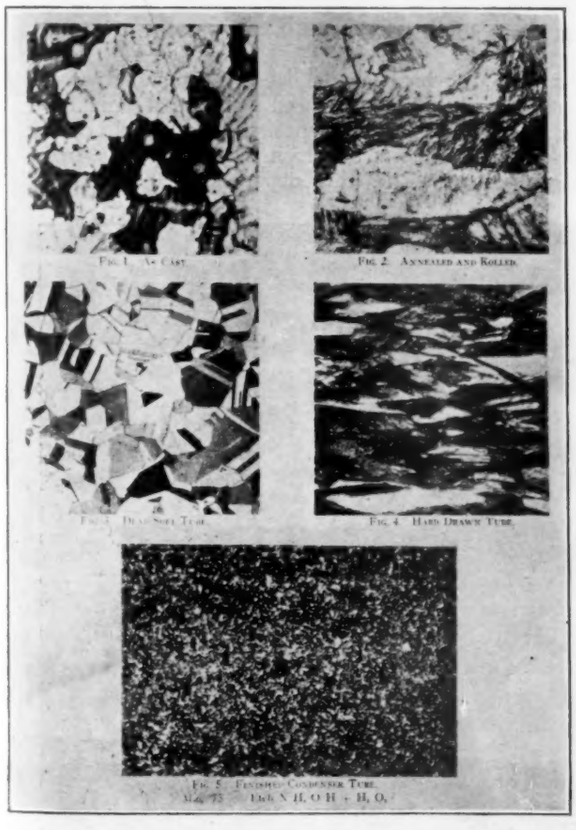


PLATE 13. MICROSTRUCTURE OF ADMIRALTY METAL

eutectoid structure. When Admiralty mixture—70 per cent copper, 29 per cent zinc and 1 per cent tin is cast, the eutectic of copper and tin (Cu_3Sn) is present. Since all eutectics are hard and brittle, it is necessary to anneal cast bars at a temperature which will absorb the eutectic before the cast bar goes to the breaking-down rolls.

Plate XIV, Fig. 1, illustrates the eutectoid segregation in Admiralty metal. Fig. 2 illustrates the cracked eutectoid in Admiralty when the metal is rolled without anneal. The micrograph in Fig. 2 was taken at 2,000 diameters and the arrows point to the cracks in the eutectic.

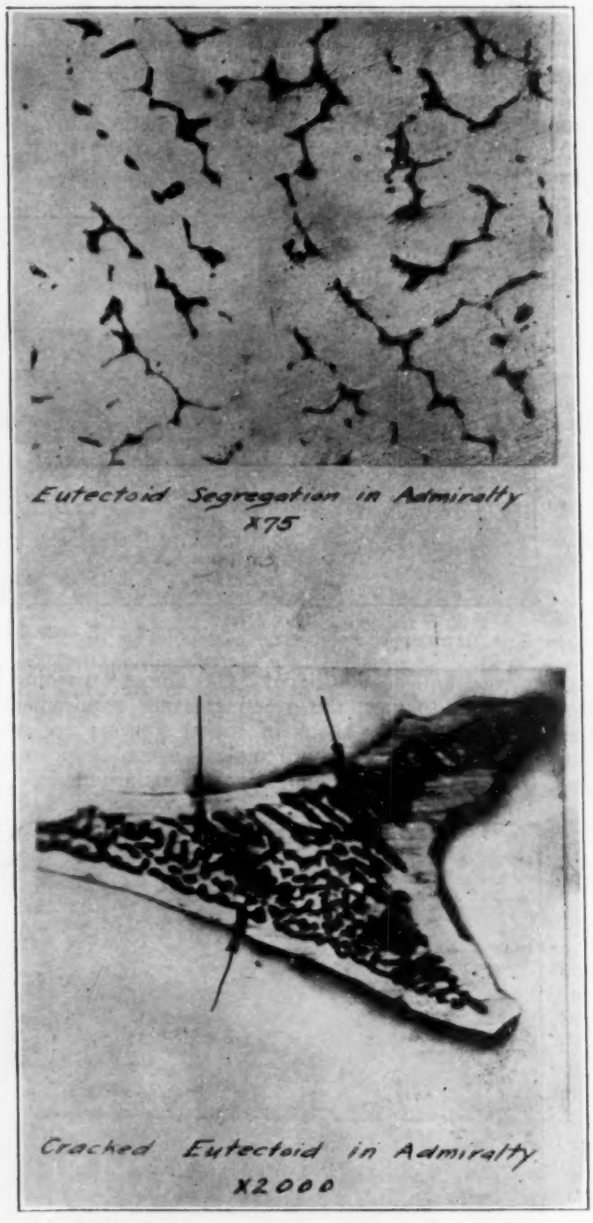


PLATE 14. SEGREGATION IN ADMIRALTY METAL
FIG. 1. ABOVE
FIG. 2. BELOW

The modern chemist and metallurgist having at his disposal new instruments such as the Quartz spectroscope, X-Ray spectrometer and the high powered microscope will be able to attack the chemical and metallurgical problems of the future with greater dispatch and accuracy than has been possible in the past.

The Ternstedt Plating Plant

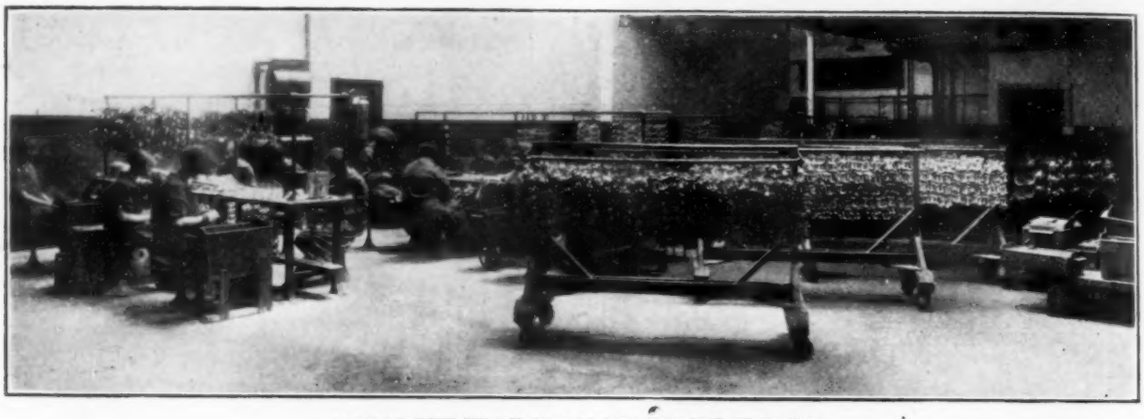
A General Description of the Electro-Plating Department of the Ternstedt Manufacturing Company, Detroit, Mich., a Division of the Fisher Body Corporation and the General Motors Corporation

The Ternstedt Manufacturing Company, Detroit, Mich., is the largest manufacturer in the world of automobile hardware, exclusively.

The plating department is not only one of the largest but also one of the best-equipped plants in the world. The floor space covered is in excess of 20,000 sq. ft., and 150 platers and helpers make up the force that turns out 300,000 pieces of finished work daily. Generators having a capacity of 19,000 amperes are required to produce the current used and an additional 5,000 ampere machine is now on order to meet the ever-increasing requirements. Thirty-five thousand gallons of nickel solution are constantly in use and a laboratory analysis is made twice each week from which additions and corrections are made.

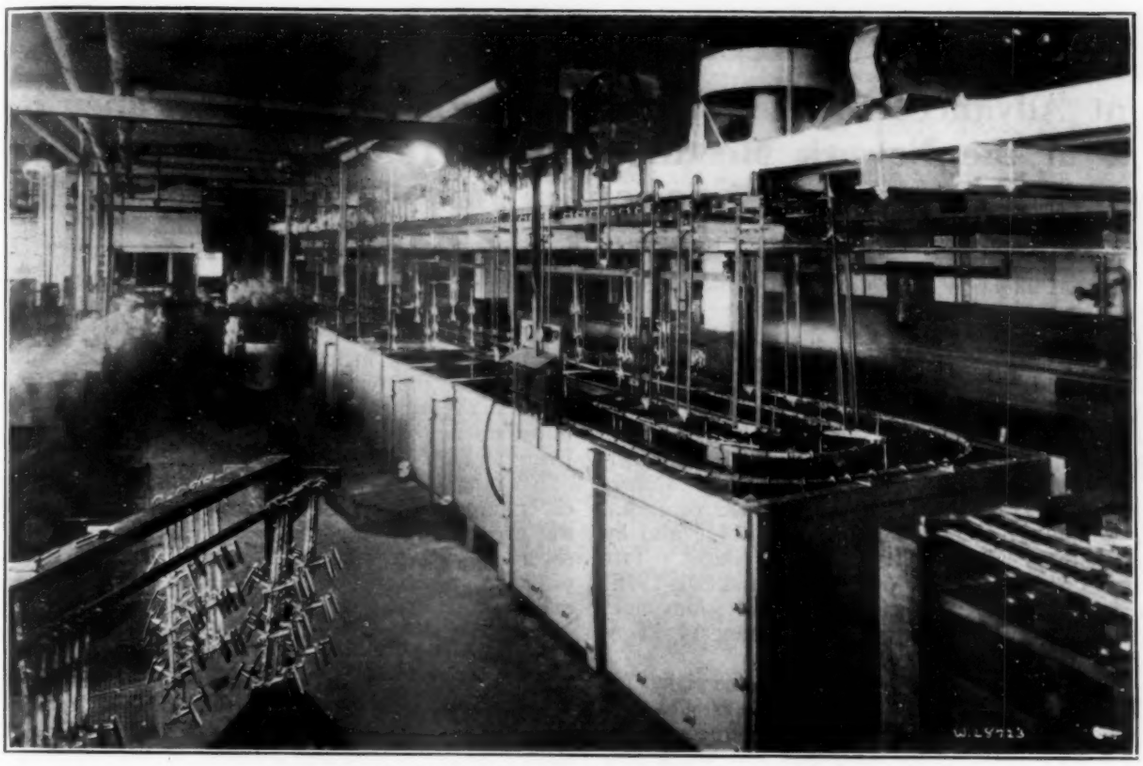
Three different formulae are used in making up the solution; one for bright deposits on brass, one for zinc-base die castings, and one for heavy deposits on steel parts, such as window frames, locks, etc.

All plating tanks are either agitated or full automatic. In the latter type the work moves into the various cleaners, nickel solutions and rinses, returning, after completing a cycle of 13 tanks, to the loading point. It may at first seem that 13 operations would be more than necessary, but with the high grade deposit demanded on General Motors products, it has been found that only by giving the die castings three deposits, viz: nickel, copper and nickel, can the tests to which they are put be met. The work performed in this department is probably more



WHERE THE WORK IS RACKED BEFORE PLATING

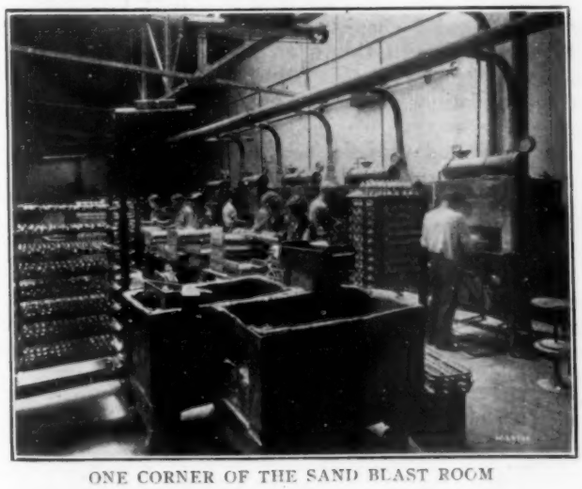
GENERAL VIEW OF THE MAIN PLATING ROOM



ONE OF THE THREE FULL AUTOMATIC CONVEYORS

familiar to the public than any other material being plated today. It consists of all the interior parts, door handles and radiator caps of General Motors cars, among the most familiar being the Buick head, Oakland wings and Chief Pontiac's bronze face.

Fully three-quarters of all deposits are on zinc-base die castings and this, it is generally known, is one of the most difficult bases on which to plate nickel satisfactorily. It is done throughout this room, however, without scouring or scrubbing any of the parts, the electric cleaners and slushing machines having been found effective and economical. The slushing machines are simple and built in the plant of the company.



ONE CORNER OF THE SAND BLAST ROOM

There are three nickel finishes popular today. They are the bright deposit, the sand blast with bright edges, and the Butler nickel which is produced, after plating, on Tampico wheels. It is quite expensive and closely resembles Butler silver. On steel parts all pieces first receive a heavy copper deposit and are then buffed and heavily nickeled with a high current, using a hot solution which gives a more adherent and rapid deposit, and a beautiful color when buffed.

Nine sand blast machines, in addition to a large Pangborn Rotary sand blast, are required to maintain the output of 300,000 pieces per day. A battery of 12 plating barrels is used for small screws, washers and bolts, and their production is not considered in the above output figures.

Electric trucks are continually delivering and removing work and large department trucks move work to and from the various units. Besides hundreds of plating racks, 3,000 pounds of wire is used every month for wiring work.

Fatigue in Metals

The coordinating committee comprising the Birmingham Local Section of the Institute of Metals, the Staffordshire Iron and Steel Institute and the Birmingham Metallurgical Society held their first meeting under the new scheme on October 28, when a lecture was given by Professor D. Hanson, D. Sc., on "Fatigue in Metals." Professor Hanson has lately succeeded Professor T. Turner as head of the Metallurgical Department of the Birmingham University. In the course of his address the lecturer summarised the extensive experiments carried out with the object of ascertaining the fatigue limit of various metals up to which a range of stress could be applied without leading to failure. In the case of non-ferrous metals the existence of a fatigue limit had been proved for a few materials, but tests involving one 100,000,000 or more reversals might be necessary to establish a fatigue range. As many as 500,000,000 reversals had not disclosed a definite fatigue limit in some cases, particularly aluminum alloys. With regard to copper and aluminum it had been proved that the development of an elastic range was accompanied by the deformation of the metals by slip, and the changes of the property of the material were the result of a type of strain-hardening exactly similar to the ordinary processes of cold working. The overstraining ultimately led to a breakdown.—J. H.

Electro-Plating Tin

Recent Advances in the Electro-Deposition of Tin. A Paper Read at the Newark Meeting of The American Electro-Platers' Society in June, 1926

By CHARLES H. PROCTOR, Plating-Chemical Editor

It is not the intention of the author of this paper to elaborate upon tin plating solutions in detail, or to discuss the merits of tin plating solutions in general. Anyone who is interested in electro-tin plating from the theoretical standpoint can readily obtain much data by perusal of the splendid paper upon this subject by Edward F. Kern, Transactions of the American Electrochemical Society, Volume 23, Pages 193 to 213, 1913; also Electrodeposition of Tin from Tin Salts of Mineral Acids by Mathers and Cockrum (Transactions American Electrochemical Society, Volume 26, Pages 133 to 135, 1914); also by the same author, "Tests of Tin Plating Baths," THE METAL INDUSTRY, Volume 14, Pages 200 and 201, 1916; Peptone as an Addition Agent in Stannous Ammonium Oxalate Baths, THE METAL INDUSTRY, Volume 14, Pages 252, 253, 1916.

Tin plating has been accomplished commercially for many years. Tinning by contact upon small articles such as pins, etc., made from steel or brass has been commonly practiced in New England for more than fifty years, possibly seventy-five years. A well-known electrical firm in Chicago has been for twelve years tin plating small steel articles that were formerly tinned by the molten process. The reason why electro-deposits of tin have not been used more commercially is mainly the great difficulty encountered with electro-tinning as compared with hot tinning. Until recently tin plating baths have shown an almost unmanageable tendency to deposit spongy, non-adherent worthless coatings. Furthermore, our steel age has demanded zinc rather than tin.

Finally, the acid tin solutions advocated by various investigators have lacked the throwing power that is almost absolutely necessary in the Electro Plating Industry because uniformity of deposition of the metal is essential.

In the electrolytic refining of any metal, throwing power is not an essential factor because the cathodes are usually flat sheets and the anodes may be closely adjusted to the cathode so the current loss is probably small.

Electro-plated articles with deep depressions and unequal surfaces must be fairly well covered with metal. Many articles are fabricated and assembled and united with soft solders. To produce a satisfactory commercial finish upon such articles, which are frequently made of several metals, copper, brass, steel, etc., the deposited metal must cover the entire article as evenly as possible.

The electro-plater is well aware from his experience in deposition of metals that the acid type of solutions do not throw as uniformly as alkaline solutions. Therefore, he has made use of the alkaline solutions to a greater extent than he has acid solutions. Gold, silver, cadmium, zinc, copper, bronze and brass are deposited from cyanide solutions; platinum, palladium and tin from alkaline solutions of the phosphates and hydroxides. Nickel solutions, although termed acid, are neutral in their cathodic reaction or only slightly acid.

Nickel cannot be deposited successfully under high acidity as can copper or zinc. Tin, however, can be deposited from solutions of tin sulphate, but all these solutions lack the throwing power necessary for uniform results, as compared with cyanide or sodium hydroxide solutions, and so are not used so extensively.

There is no question that electro-deposits of tin can be more commercially used than at present when we consider that all the food products that we consume today must be enclosed in hermetically sealed tin cans to preserve the food from contamination and decay. It needs but a slight stretch of the imagination to realize what tin means to the human race under our modern methods of living.

No other metal except silver could be used commercially for the preservation of food products and silver has too great an intrinsic value to be used in coating thin sheets of steel to manufacture cans for the preservation of food products, as we do now, with thin sheets of steel and molten tin.

Glass is a splendid factor, but is too fragile to be used to any great extent in the commercial canning industry.

Some day we shall do more electro-tin plating than we do now, and use over again the tin recovered from old tin cans and scrap tin that cannot be recovered in the metallic state. Nearly a year ago a friend of mine who is chief chemist with a well-known firm which is a division of one of the largest manufacturing organizations in the world, desired to know whether it was possible to electro-tin plate an article which he described in detail. He said that they had experimented with various types of electro-tin solutions, but had been unsuccessful in obtaining the uniform deposition of tin they required. They had been previously hot tinning the article, but the coating had not proved satisfactory. I explained that the article could be electro-tin plated successfully and gave him details accordingly.

Before commencing experiments in their research division, he requested to be advised where it was possible to see electro-tin plating solutions in commercial operation. I sent him to a firm in Cleveland who have been tin plating steel foundry chaplets in mechanical barrels for the past few years with almost an identical solution. From the results he saw at this plant, he decided to advocate electro-tin plating for this particular product, and experiments were begun.

The result today of these experiments is the operation of several large tin plating solutions with a capacity of two thousand gallons each. More than one thousand refrigeration coils are electro-tin plated each day. The coils in the unfinished state are electro-cleansed, copper plated, in a combination cleaning and copper plating solution, and then electro-tin plated for twenty minutes with a maximum current density. I am not positive, but I believe the amperes per square foot of surface area, has reached one hundred. This current density is not permissible upon such articles as coils, etc., but 25 to 40 can readily be carried. The solution advocated for doing this work was as follows:

Water	1 gallon
Sodium Stannate	28 oz.
Hydrated Tin Oxide	2 oz.
Powdered White Starch	⅛ oz.

Potassium resinate prepared by dissolving powdered resin in a concentrated hot solution of potassium hydroxide has been found a splendid colloidal factor for this type of solution and can be used as required. The temperature of the solution should be maintained at 160°-180°

F. Anodes of sheet steel and pure Straits tin—70 per cent tin anodes and 30 per cent steel—are approximately the best proportions to use; voltage 4 to 6. The anode reaction is about 60 per cent as compared with cathode deposition. Sodium stannate is added at intervals to the solution to maintain a balance.

Hydrated tin oxide should at all times be added to the solution so that some remains upon the bottom of the tin plating tank. The function of the hydrated tin oxide is to replace the tin withdrawn from the solution in excess of anodic reduction. Furthermore, as the metallic tin is withdrawn from the solution by electrolysis, eventually free sodium hydroxide would result in excess. An excess of this material is detrimental rather than beneficial to the deposits of tin. Some free stannous chloride may be added to the solution alternately with the hydrated tin oxide. A small amount of chlorine has been found advantageous in solution, giving a better anodic reduction and better throwing power. An excess of chloride, however, must be avoided because of its corrosive action upon the steel anodes. Sodium chloride would no doubt give better results because being neutral in its action it would not affect the free sodium hydroxide in the solution. Its addition would be more suitable than adding stannous chloride for reasons before stated. Not more than one-eighth ounce per gallon per day should be required to give ample chlorine for tin anode reduction. No set rules can be laid down for additions of sodium stannate and hydrated tin oxide. This would have to be determined either by current conditions or by analysis of solution at intervals. The value of the steel anodes cannot be satisfactorily explained. Apparently anodic polarization is prevented by the use of such anodes. This has been found to be the most plausible answer for the use of such insoluble anodes in sodium cyanide, sodium or potassium hydroxide solutions of zinc and cadmium.

A splendid field can be opened up in electro-tin plating milk cans that were originally hot tin coated and have become worn out.

The sodium stannate solution has proven to be the only satisfactory tin solution for the manicure file industry. All firms in Fremont, Ohio, manufacturing such products use this type of solution.

There are many possibilities of tin plating copper wire now tinned by the molten method. These could be electro-tinned and passed direct from the solution to the wire drawing dies to produce a lustre coated finish.

There are many articles that could be electro-tin plated. Tin is readily polished to a lustre finish by tumbling with macerated leather, bran or hard wood sawdust, Vienna lime or flated Whiting as the polishing medium. Electro-tin plated surfaces can be scratch brushed to a lustre finish by dry brushing or by buffing with soft buffs and Vienna lime composition.

Electrochemists Discuss Pure Metals

A symposium on Pure Non-Ferrous Metals was the subject of the meeting of the New York Section of the American Electrochemical Society at Keene's Chop House, New York, on November 19th, 1926.

S. Skowronski of the Raritan Copper Company displayed samples of very pure copper of 106% conductivity. He discussed the preparation of pure copper. In a paper crammed to the limit with technical data, he traced the experimental effects of metals and metalloids on the conductivity of copper, and on each other in the copper. Those elements forming alloys with copper have only a slight effect on the conductivity; those forming insoluble compounds or which themselves are insoluble in the copper, have a very large effect. Their effect is out of proportion to the amount of material present. These materials locate in the crystalline boundaries. Mr. Skowronski's conclusion was that the conductivity of copper is not at all a criterion of its purity. The copper producers and manufacturers are now engaged in intensive research to determine all the factors in the production of very pure copper and the effect the impurities have on the conductivity. This work is now well under way. Its extension into the effect that impurities will have on other physical properties of copper is expected to be completed in the next five years.

E. V. Pannell of the British Aluminium Company presented a paper on Pure Aluminum, now the fourth most important metal in point of tonnage among the non-ferrous metals, but second in point of volume, which is a direct measure of its utility. He discussed the production of pure alumina, one of the greatest sources of contamination affecting the purity of the metal. He pointed out the lack of suitability of many bauxite deposits for aluminum production. New methods of refining the ore were touched on and the production of the pure aluminum of the present date, 99.88% pure. Its production is not as yet on a commercial footing.

R. J. McKay of the International Company spoke of the remarkable strides in the industrial application of pure nickel tubes and other similar equipment in the food and milk industry. Nickel, practically sulphur free, is now produced on a commercial scale. Only a decade ago this was not possible. Chemically pure nickel shows greater corrosion resistance than do its alloys or nickel with slight amounts of impurities. It has higher conductivity but in the electrical industry, nickel is valuable for its resistance, not its conductivity. The pure nickel will run 99.9% nickel plus cobalt. Mond nickel made by the carbonyl process is free of cobalt.

W. A. Cowan of the National Lead Company presented a paper on Pure Lead. He showed samples of double electrically refined lead which analyzed 99.99943% lead; .00024% Sb; .000057% Cu; .000193% Fe and .00008% Zn; giving total impurities of 0.00057%. The perchlorate bath with clove oil addition agent was used for this work. At the present time the National Lead Company is doing considerable work on research of the physical properties of this pure lead. Pure lead shows much larger crystals than does lead with small amounts of impurities.

H. M. Cyr of the New Jersey Zinc Company presented a paper tracing the development of spectroscopically pure zinc. The abnormally large effect of traces of impurities in zinc metal was pointed out. In regard to the properties of zinc the literature is decidedly contradictory as different workers employed materials of varying purity. Zinc was prepared by repeated fractional distillation, to produce a product 99.99996% pure. This material is untarnished by exposure to air, and shows a remarkable resistance to solution by hydrochloric and sulphuric acids, while nitric acid has a much greater action than on ordinary zinc metal. Mr. Cyr discussed the properties, both chemical and physical, of this new metal at considerable length. Cadmium of similar purity has also been produced.

C. L. Mantell spoke briefly on Pure Tin, reviewing its properties and preparation by the electrolytic method, giving metal 99.98% pure. Work is now in progress on the preparation of exceedingly pure tin from especially purified stannic oxide by hydrogen reduction. The economic side of pure tin production by electrolytic refining was of considerable interest and aroused a large amount of discussion.

National Founders Association

The National Founders Association held their thirtieth annual convention at the Hotel Astor, New York, November 17 and 18, 1926. The features of the convention were as follows:

Reduction urged in Federal and State taxes and restriction of local government expenditures.

Work done with farmers' groups in the solving of the problems of industry and agriculture.

Progress in industrial educational movements by that committee.

Practical economics discussed by M. C. Rorty, vice-president International Telephone & Telegraph Company, New York.

Tax problem of the country reviewed by James A. Emery, Washington.

William H. Barr, president of William H. Barr, Inc., Buffalo, N. Y., brass founders, was reelected president of the National Founders Association, which he has lead continuously since 1913. In his opening address, Mr. Barr said, in part:

"It is true that before the enlightened spirit of modern industry had fully developed workers did need organizations, because employers—a few of them with an unfortunate lack of vision—took advantage of their employees' economic necessity. The corrective, however, has been applied in our industry, and as a result unionism in the foundry is steadily declining. The corrective is that equitable spirit of unlimited opportunity when dealing with our workers, of which the National Founders Association was a pioneer and promoter.

"Should the National Founders Association ever become an instrument of oppression, promoting what might seem to be the selfish interests of its members, it would then begin a period of ineffectiveness. This association should ever be guided by the spirit of our people, who are above all else fair minded, and we should remember that a wrongful strike has rarely been won by the unions against public opinion, and a strike called where the equity was with the unions has seldom been lost.

"There has been much public discussion of the reasons for the unprecedented prosperity of our country. Commissions from other lands have come here to learn the secret. They are substantially agreed that our success is due to the high efficiency of our industry which makes possible the phenomenon of low production cost upon the one hand and a high wage scale on the other. The efficiency of American industry is due to the confidence and cooperation of the American worker, to the freedom of American management from the restrictions of hostile unionism and socialistic governmental regulation which hamper our foreign competitors, and to unprecedented extension in the use of labor saving machinery. These things are in turn due to the open shop policy of American industry and to those progressive policies and activities which I have touched upon and in the adoption of which our association has been a leader. We are glad that those policies have been so widely accepted. To abandon them now would be not merely for our association to abdicate a position of well earned leadership. It would mean our falling out of the ranks and remaining not even abreast in the march of progress."

In conclusion Mr. Barr said that the members of the association must always devote themselves to the welfare of their workers. "That welfare," he said, "does not consist of establishing uneconomic conditions or temporizing with conditions that may exist, but rather in fairness than in kindness, in equity rather than in coddling, and in careful recognition of the mutual duty existing between employer and worker. As a group we stand for the liberty of all industry, the independence of employers and the equal independence of all workers. In maintaining this faith we shall increase in public service and be an important unit in the great industrial machine working always for the prosperity of our nation."

Drinking Water for Mills and Factories

The tendency of modern production to concentrate in larger units, housed in huge mills and factories, has made real problems of matters that in former days more or less took care of themselves. Certain essentials to human welfare and efficiency must be provided for in the design and construction of large buildings that needed scarcely a thought under the conditions of small, isolated production; for example, ample light, fresh air and wholesome, palatable water to drink. It has become the task of the engineer to provide the means whereby these basic requirements may be more abundantly and certainly supplied to every worker than when left to the hazard of natural conditions.

Drinking water has been taken over by the engineer. It is a long way from the pump in the mill yard and the bucket on the bench to the modern fountain with its ever-available supply of clean, cool water within easy reach of every worker. The transition has not been made in a single stride. The refrigerated drinking water system, now everywhere recognized as the only adequate method, is the outgrowth of the failure of other systems to provide a sure, wholesome, accessible and economical supply to large groups of persons.

The provision of a proper drinking water supply is an economic matter in addition to its humanitarian aspect. To illustrate, take a somewhat extreme, though common enough case. An overheated worker drinks freely from a tank of ice water and gets a severe case of cramps. Not only is he incapacitated for some time, but one or two others must be called from their work to take him out, and a whole department is more or less disorganized.

More common and, in the aggregate, even more wasteful of productive time is the grouping of employees about a tank waiting for a chance at the cup, or running off city water to get it cool, prolonging the time in visiting and skylarking until five or ten minutes are often consumed where, with proper facilities, one should suffice.

The refrigerated drinking water distribution system is the one method that meets every requirement. It eliminates waste of time and water and the "mussiness" of other methods.

In a metal working plant in Pittsburgh with 1,400 employees,. the cost of supplying refrigerated drinking water through pipe lines and fountains was found to be 32 per cent less than that of the former tank and well supply.

A North Carolina textile mill replaced "bucket distribution" with a mechanically cooled system at a saving in operating cost of 34 per cent, and a South Carolina mill reports a saving of 39 per cent over the cost of supplying water from ice water tanks to its 1,600 workers.

The Armstrong Cork & Insulation Company of Pittsburgh, Pa., has just published a book, "Refrigerated Drinking Water Systems," a copy of which may be had on request addressed to them.

THE METAL INDUSTRY

With Which Are Incorporated

THE ALUMINUM WORLD, COPPER and BRASS, THE BRASS FOUNDER and FINISHER
THE ELECTRO-PLATERS' REVIEW

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EDITORIAL

SWORDS TURNED INTO PLOWSHARES

The time has not yet come when the world is altogether at peace nor are we bold enough, even in private, to set a day for this happy situation. We can, however, witness on every side the cheerful spectacle of great plants only a few years ago making arms and munitions, which are now busily engaged in the arts of peace, or at least making every effort in that direction.

The Ford plant in Detroit has scrapped 199 vessels of the war-time merchant marine fleet, originally built by the U. S. Shipping Board. The steel and metal go into automobile parts; the wood goes to lumber mills. Scrap wood and cork are ground for packing. Piping faucets and plumbing fixtures are stored for future use. Stacks and air pipes are installed in various plants wherever needed. Wooden deck materials are used for crates and boxes. Nails are melted up and run into pegs.

Plants like the General Electric Company, the Westinghouse Electric and Manufacturing Company, the Western Electric Company and the Bethlehem Steel Company, which during 1917-18 were almost entirely taken up with war work, are now engaged in the arts of peace. This is noteworthy, but not so pointed as an example of the change because these plants are normally engaged in manufacturing products for general consumption. What is particularly interesting is the fact that such companies as the Savage Arms Corporation, the Remington Arms Company and Colts Patent Firearms Manufacturing Company, are turning to other fields of endeavor. They are making adding machines, cash registers, metal parts, washing machines and office devices of various kinds. It seems that war, at least in the United States, is a lessening support for business, while peace as an aid in this direction is daily growing stronger.

The extraordinary researches carried on in the General Electric Company point to the belief which that company has, in the fundamental soundness of its industry, the use of electrical equipment and devices of all kinds, from incandescent lamps to great hydro-electric equipment. The new cathode tube developed by Dr. Coolidge of that company may open up untold possibilities. It is now at the same stage that the X-ray was two or three decades ago, with at least equal if not greater possibilities.

To be sure such inventions may be used for war purposes when the need arises, but the point is that they are sought for and worked on without war in mind. Whether or not the pen is really mightier than the sword is a question which we are willing to leave to others to decide. We are content to rest upon our belief that at the present time, at any rate, there is more pleasure and profit to be gained from making things to use in daily life than in making things for fighting purposes.

REPAIRING THE LIBERTY BELL

The Philadelphia Foundrymen's Association, according to a recent press report, is considering an attempt to seek permission to restore the old Liberty Bell to its original sound condition by welding the now famous crack. It is believed by some that a careful investigation would disclose the cause of the crack and welding could close it up again. The idea behind these plans is that the bell should be put in condition so that it can be rung again, thus reawakening the ideas of liberty as they existed in 1776.

It is stated that the efforts of the Foundrymen will undoubtedly meet with strong opposition from many Philadelphians to whom the "revered mark is one of the evidences of a stage in our history."

The question is one of those which is likely to be taken up warmly by newspapers, civic societies and others and to fill columns of space, particularly on Monday mornings when other news is scarce. It will call forth heroic speeches on both sides and give countless public spirited citizens a chance to orate and write to the newspapers.

We take the liberty of making a suggestion to our Philadelphia friends which should be of assistance not only to them, but to the brass foundry industry. We note in the daily press that the Wanamaker store in Philadelphia will install a mammoth bell, and also that this bell will be cast by a British company. It seems to us that it would be in order for the Philadelphia foundries to show their ability and energy by offering to cast a duplicate of the old Liberty Bell or one of greater size, which might be hung and rung in a historic belfry or in the tower of some new institutional building of which there are such a number in Philadelphia. Such action would not only stimulate interest but would also show that Americans can make castings for all purposes and that it is no longer necessary to go abroad for big bells. The payment for the casting could probably be brought about by the generosity of Philadelphia philanthropists or by popular subscription. Let the spirit of '76 produce a new Liberty Bell.

ZINCING VERSUS GALVANIZING

We are so often requested by readers for information on zinc coating and there are now so many methods of applying this coating—all with different names—that the following excerpts from a letter to us from W. T. Flanders, the author of the leading book on the subject, entitled Galvanizing and Tinning, will be of interest to all who have any connection with this type of work.

Mr. Flanders writes that "while it is true that the word zincing is a more appropriate term to apply to the different processes of coating with zinc than galvanizing, nearly all the processes are generally known as galvanizing. Sherardizing passes as galvanizing as well as electro-galvanizing and the process of coating with zinc by the Schoop process is often referred to as galvanizing. I have had occasion many times to explain that the process known as galvanizing was in reality, zincing."

There are now the following methods of applying zinc to other materials.

1. Hot dipping.
2. Electro-plating.
3. Sherardizing.
4. Spraying.

It should be made clear that all of these four methods are methods of zincing. The only one to which the term galvanizing might be applied correctly is the electro-plating process. The situation is growing more and more confused and really calls for clarification, not only by some central technical authority, but throughout the trade.

It is, of course, much easier to work out suitable nomenclature around a table than to institute its use throughout the industry, but it seems to us that the following

names could all be used with increased convenience.

1. Hot zincing.
2. Electro-zincing.
3. Vapor zincing.
4. Spray zincing.

All of these come under the general classification of zincing. We have the art of tinning. Why not zincing?

We offer the above, not as the last word, but as a suggestion which we hope may lead to definite action. Such a step in the zinc industry would be valuable, not only for its own sake, but as an example to other metal-working industries, many of which are greatly in need of good nomenclature.

TECHNICAL TRAINING FOR PLATERS

As described on page 514 of this issue, the Philadelphia Branch of the American Electro-Platers' Society has instituted a course in elementary and advanced chemistry for platers and assistant platers. Classes will be held in a high school laboratory set aside for this purpose, and will be under the direction of Willard M. Scott, a member of the Philadelphia Branch, and a capable chemist. These classes are open, it will be noted, not only to members of the Philadelphia Branch but also to the assistants in their departments.

The Philadelphia Branch has always been known as one of the wide-awake organizations of the Society. This last step, however, marks such progress that it should not be left unnoticed. It means that this branch has officially recognized the need for technical training among its members and has taken steps to supply this training instead of leaving them to pick it up as best they can. As a result the classes will be arranged to suit the members; the course should be such as to point out the constant relationship between chemistry and electro-plating. It should be no cut-and-dried course in theoretical chemistry, but an explanation of the "whys" and "wherefores" underlying the reactions which occur in the plating tank and cleaning solution. Chemical formulae will be not merely heiroglyphics but live symbols, showing graphically the constituents of the materials which the plater handles every day. This is, of course, as it should be.

The Philadelphia Branch is to be congratulated also upon its broad-minded policy of admitting platers' assistants. A good plater is not only a man who can operate his solutions well, but also one whose department runs smoothly while his back is turned. This cannot be effected with inefficient and incapable help. Every intelligent plater will understand that a good assistant is not a rival for his position but an aid in keeping up the quality and quantity of his output.

Other branches of the Society have instituted such courses, but some are still without them. We hope and believe that those branches of the Society who have not yet taken this step will follow suit shortly, and also admit assistants. Perhaps it will be only a matter of time before the Society admits assistants to junior membership.

OUR JANUARY ISSUE

For the information of our readers, who are, of course, accustomed to receive THE METAL INDUSTRY by the tenth of each month, we wish to state that our January issue will not be in their hands until January 13th or 14th. Our January number is always the largest and in some ways, the most important of the year, demanding special work in the compilation of reports, charts and surveys of the year's progress. For this reason more time is allowed for its preparation.

THE PRESIDENT COMMENDS ADVERTISING

A short time ago, in a speech before the American Association of Advertising Agents in Washington, President Coolidge made some remarks on advertising which will bear repetition, in view of their fundamental character and thorough understanding of the basic principles involved.

The President described advertising as ".....a most potent influence in adopting and changing the habits and modes of life, affecting what we eat, what we wear and the work and play of the whole nation, and continued, in part as follows:

"When we stop to consider the part which advertising plays in the modern life of production and trade we see that basically it is that of education. It informs its readers of the existence and nature of commodities by explaining the advantages to be derived from their use and creates for them a wider demand. It makes new thoughts, new desires and new actions. By changing the attitude of the mind it changes the material condition of the people.

"There can be no permanent basis for advertising except a representation of the exact truth. Whenever deception, falsehood and fraud creep in they undermine the whole structure. They damage the whole art. The efforts of the government to secure correct labels, fair trade practices and equal opportunity for all our inhabitants is fundamentally an effort to get the truth into business. The government can do much in this direction by setting up correct standards, but all its efforts will fail unless it has the loyal support of the business men of the nation."

The remarks on the creation of new demands and desires, of course, apply particularly to advertising appealing to the general public and featuring luxuries and novelties and in other ways tending to raise the physical standards of living. The advertising of technical products, however, falls into a different category. The advertiser does not attempt to create or stimulate a demand. He first assures himself of the existence of the demand, the need for some definite article and then manufactures that article to satisfy this already existing demand. His advertising matter points out this need; in other words, makes it conscious instead of allowing it to be forgotten. His output then is intended to fill a vacuum and his advertising calls attention to it, whereas in the case of popular products, the advertising is often intended to create a vacuum.

We believe we are safe in saying, therefore, that the advertising of technical products is much more likely to be accurate and truthful than any other kind. Its buyers are more skilled in judging their purchase and the trade is much more critical than the general public, as it constantly weighs its purchases against their costs.

President Coolidge's recognition of the fundamental importance and basic value of advertising in all its departments of course adds weight to this field of business. The day has passed when advertising was considered an unfortunate necessity, and a parasite on business. It is now known to be an important part of the sales department, the educational factor which does missionary work at a much lower cost than it could possibly be done in person, and prepares the ground for the approach of individual salesmen.

New Books

Aluminum and Its Alloys. By M. G. Corson. Published by D. Van Nostrand Company. Size 6 in. x 9 in. 285 pages. Price $8. For sale by THE METAL INDUSTRY.

For a number of years there has been a distinct need for a book dealing in a scientific manner, solely with the light alloys of aluminum and preferably specializing upon those warranting or promising commercial development. Such a book would be in three sections dealing with (I) the equilibrium diagrams, (II) the metallography and (III) the physical properties, treatment and use of the list of alloys studied. It would be desirable in such a book to eliminate all the waste effort and unprofitable studies which unfortunately tangle up this subject at the present time and to concentrate attention intensively on those series which give clear signs of practical return. In the present work the author has come very near to filling the above requirements. In a book having 285 text pages and more than 117 inserted plates he has gone far toward the complete classification of light alloys. The error, if any, has been the inclusion of metals having none but academic interest and the consequently briefer treatment of others which merit more extended examination. Nevertheless, the reader cannot fail to be impressed with the profound and conscientious study which the author has devoted to his subject even though his symbols and abbreviations, as well as the arrangements of tables are at times hard to follow. The book will be appreciated better on the second or third reading than on the first.

Pure aluminum and its properties furnish a brief introduction to the volume. Some of the figures quoted are recent while others date back a number of years. Hidnert's value for thermal expansion determined at the Bureau of Standards in 1924 probably supersedes the work of Dittenberger in 1902 quoted by the author. Electrical resistivity of aluminum wire is commonly taken at 2.873 microhms; Richards values for this property have long been shown to be inaccurate.

Constitution of binary alloys is fully treated together with a series of diagrams extending from Al-Ag down to Al-Zn. In the section on Aluminum-Silicon alloys to which many readers will turn with interest, the original diagram of Fraenkel in 1908 is reproduced showing the eutectic at 13.8% Si, but more recent independent research by Gwyer, and Ohtani place the normal eutectic point at 11.7% and 12.2% respectively. Research work on aluminum-silicon alloys by Edwards, Churchill and Frary, and later by Archer and Kempf is of the greatest importance and should have been referred to. The explanation of silicon alloy "modification" is quite broad and may be construed as in alignment with the colloid protector theory of Gwyer. Some irregularity must have occurred in the modification of the alloys under the author's observation as the tensile strength values are from ten to twenty per cent too high and the ductility unusually low.

Duralumin is well treated although reference might have been made to American investigators who followed Merica's work in 1922 for example, Jeffries and Anderson and Daniels working independently.

In alluding to the newer heat-treated alloys known under the trade names of 51S and 25S, it is clear that these metals originated from Duralumin in the sense that each possesses part of the characteristics of the older alloy. Since the hardening of Duralumin is generally attributed to the dual effect of (a) the dispersion of the $CuAl_2$ particles and (b) the formation and solution of Mg_2Si compound, it was reasonable to divide this alloy up into two distinct compositions, one comprising Aluminum and Copper (25S) and the other Aluminum, Magnesium and Silicon (51S) and this is evidently what was arrived at by Jeffries and his co-investigators. To compare 25S alloy with Lautal and 51S with Aludur tends to confuse the subject and is not quite correct.

In the second division of the book dealing with the technology of the alloys the author derives a large number of useful practical facts from the constitutional studies in the preceding section. The same order is not followed however. Nickel is treated under the heading of "Magnalium," several compositions are referred to under the caption "Alloy No. 12" and other slight irregularities of arrangement make this portion of the book somewhat hard to follow. Emphasis is placed on the free use of chills in casting which is at variance from good foundry practice. The use of zinc receives less than its due merits and the remarkable properties possessed by the 145 alloy (an aluminum-zinc-copper mixture) are not referred to. While the American foundry trade has virtually standardized the 8% Copper alloy this has arisen from its simplicity and cheapness rather than its quality. The individual crystals in the alloy are virtually no stronger than those of pure aluminum but their planes are reinforced or keyed together by the particles of $CuAl_2$. A solid solution as of Zinc and Aluminum yields stronger individual grains with increased tenacity and ductility and the advantage of a small percentage of $CuAl_2$ can be realized in addition. Thus the improvement in the metal is twofold.

The reference to a 14% Zinc alloy as a "die casting" metal is obviously in error; the shrinkage and hot shortness rule out zinc alloys except for sand molds.

Patent specifications in light alloy metallurgy unfortunately do not throw much light on real development work. The list of patents on pp. 150 is not complete (silicon alloys are not even mentioned), but nevertheless comprises a number of mixtures which have no commercial possibilities whatever. Indeed it is difficult to see how an aluminum alloy can be prepared, even in the laboratory, containing 12% Tungsten.

In the chapter on Corrosion a useful series of results is tabulated bearing on the behavior of rolled aluminum in various acid solutions, reference being made to the well known work of the British investigators, Seligman and Williams. The subject of marine exposure has been referred to only briefly; it would have been appropriate here to allude to the tests made by Basch and Sayre in which a very definite scale of corrodibility was determined for more than twenty alloys under equivalent conditions.

One statement by the author cannot be passed without challenge; it is said that copper (up to 2%) in solution in aluminum will retard corrosion. It is not known what reagent is alluded to here but experience generally is all the other way and even the small incidental copper impurity found in some brands of aluminum is a menace under corrosive conditions; so much so that "copper-free Aluminum" is generally specified.

Structurography (or metallography) of the various alloys is very fully treated and illustrated and the reader will find the series of microphotographs most instructive in a comparative sense.

In its entirety the book is a meritorious study of the subject and undoubtedly fills a place not at present occupied in the literature of Aluminum. The student of this subject, whether metallurgist or foundryman, will therefore find it a valuable addition to his library.

ERNEST V. PANNELL.

Making a Living. By L. S. Lyon. Published by Macmillan Company. Size 5½ x 8, 622 pages. Price, payable in advance, $1.60. For sale by THE METAL INDUSTRY.

The purpose of this book is, as stated, to help its readers know more about the world in which they live and how they may plan to fit themselves into it successfully and happily. The type of questions it sets out to answer are: "When ought I stop going to school?" "Shall I try to go to college?" "Shall I work in a factory, office or on a farm?" etc. In other words, the book is meant to help, particularly the young, to adjust themselves to the world.

Necessarily, a work of this character cannot be "practical" in the sense that a technical book is. It must set forth broad principles, give historical backgrounds, and describe as many specific phases of modern industry as possible, including simple explanations of different features of economics.

This is a task Professor Lyon does very well, and although his book is pointed particularly toward the young, those who have children of their own or who employ many young people in their plants, would do well to read it and recommend it where it can be of service.

American Society for Testing Materials Standards Adopted in 1926. Published by the American Society for Testing Materials. Size 6 x 9, 102 pages. Price, payable in advance, $1.50. For sale by THE METAL INDUSTRY.

This booklet is the second supplement to the 1924 issue of the Triennial Book of Standards. It contains 16 new standards adopted and also replacements of 7 standards.

New standards of special interest to those engaged in non-ferrous metals are as follows: B-37-26, Aluminum for Use in the Manufacture of Iron and Steel; B-49-26, Hot-Rolled Copper Rods for Wire Drawing; B-23-26, White Metal Bearing Alloys (known commercially as "Babbitt Metal").

SHOP PROBLEMS

IN THIS DEPARTMENT WE ANSWER QUESTIONS RELATING TO SHOP PRACTICE

ASSOCIATE EDITORS { JESSE L. JONES, Metallurgical; WILLIAM J. PETTIS, Rolling Mill; W. J. REARDON, Foundry; W. L. ABATE, Brass Finishing; CHARLES H. PROCTOR, Plating Chemical; P. W. BLAIR, Mechanical

BARREL PLATING

Q.—We are having some difficulty maintaining our Copper color in barrel plating zinc parts due we think to lost zinc parts into our electrolyte.

Also please give a copper formula for barrel plating at 12 volts, hot or cold solution. What would be necessary to maintain our finish under these conditions?

A.—We presume that the articles you copper plate in mechanical barrels made of sheet zinc are small so that the total surface area copper plated at one time is very large in proportion to the anode surface. If this is true, no doubt you use considerable free cyanide to maintain anode reduction to the maximum point. It is the removal of the oxide of zinc, presumably, from the depressions of the articles which becomes converted to zinc cyanide and the reduction of many of the zinc articles that go down to the bottom of the solution, also by the cyanide, which produces a bronze and sometimes a brassy color on your product. You can regulate the copper color by heating your solutions up to a point which will give a good copper color, if the tone is too light or of a bronze tone. The elimination of ammonia in any form or the additions of soda ash or caustic soda will to a great extent, prevent light colored copper deposits. Sodium bisulphite however, is excellent both as a conducting factor and an aid in anode reduction. Considerable of this material may be added to the copper solution without any detrimental results up to 4 ozs. or more per gallon of solution. As mentioned, heat is a good factor for color regulation. The following formula should give excellent results for your purpose:

Water	1 gallon
Sodium cyanide	7½ ozs.
Copper cyanide	6 ozs.
Soda ash 58%	2 ozs.
Bisulphite of soda	2 ozs.

Temperature 80° F. upwards to 120° F., at 8 volts. The upkeep of this solution, as may be necessary, should be as follows:

Water	1 gallon	Temperature 140° F.
Sodium cyanide	16 ozs.	
Copper cyanide	16 ozs.	
Bisulphite of soda	2 ozs.	

Add the bisulphite of soda when the solution is cool. The latter above formula should be considered a stock solution. Prepare as many gallons as you may desire. Add proportions of your stock solution to your regular solution as may be required, to maintain a standard amperage; in addition add from ⅛ to ¼ oz. sodium cyanide per gallon of solution per day to maintain anode reduction as free cyanide.—C. H. P. Problem 3,585.

CLEANING BRASS CASTINGS

Q.—We make all kinds of brass castings, mostly small pieces and have tried many ways to clean them, but the best way I have found so far, is rolling in cold water. Still they are not what they should be. I wish you would give me information as to how I can get a more brassy finish on the work. It is a cheap kind of work, mostly parts for electric lamp shades.

A.—We suggest that you try the following method to replace ordinary water tumbling of small brass castings you now use. Water alone will not clean the castings and give a good color.

Water	1 gallon
Soap chips	1 oz.
Kerosene oil	1 oz.
Sodium cyanide 96-98%	¼ oz.

Dissolve the soap chips in 1 quart boiling water; then add the kerosene and cyanide; then add to 3 quarts of warm water to make a gallon. It is possible that the proportions given will be ample for 2 gallons of water. You can decide this yourself.—C. H. P. Problem 3,586.

CLEANING BRONZE

Q.—Will you kindly inform me of a formula to clean old plates (bronze) now on buildings without taking them down, as well as replacing them after washing?

A.—There are several methods used in cleansing bronze plates on buildings without removing them. If the plates have been lacquered and the backgrounds have been made dark or oxidized with liver of sulphur, then the lacquer must first be removed with wood alcohol. Prepare a strong solution of sodium cyanide and water which should be warm; water 1 gallon; sodium cyanide 4 to 8 ozs. Put on a pair of rubber gloves and go over the plate until the oxidation is entirely removed and the metal clean. Wash with water to remove the cyanide. You can scour the plate with sand and pumice stone to produce a clean surface, then dry the plate and lacquer or wax it with a good floor wax. Or after cleansing as outlined and drying thoroughly, you can rub down with steel wool or coarse emery and oil and cotton waste to produce a lustre, then remove the oil from the plate with gasoline; dry and lacquer or wax.—C. H. P. Problem 3,587.

COPPER AND NICKEL SOLUTIONS

Q.—We are starting to put a patented article on the market that has to be nickel and copper plated. We are taking the liberty of asking you if you would advise us as to the best formula for nickel plating and copper plating and what proportion of liquid for the size of tanks.

A.—You do not state the nature of the basic metal upon which you desire to plate copper and nickel. If steel or brass, then the following formula will give you excellent results. We give you proportions based upon 1 gallon. You can figure out the number of gallons your solution tanks will hold and then add the total number of lbs of each chemical required to make up the total number of gallons of solution. It is presumed that you are familiar with electro-plating operations. It is necessary to having plating experience for satisfactory results.

Copper Solution:

Water	1 gallon
Sodium cyanide 96-98%	4 ozs.
Copper cyanide	3 ozs.
Bisulphite of soda	1½ ozs.
Caustic soda	½ oz.
Hyposulphite of soda	1/32 oz.

To prepare the solution, dissolve the sodium cyanide and copper cyanide in ⅓ the total amount of water to be used, heat to 120 deg. F. When these materials are dissolved, add the balance of the water cold to make up the total amount of solution. Add the three sodium salts in the order given; stir well and the solution will be ready for use with copper anodes of soft sheet copper; voltage 4 to 5. Temperature 80 to 120 deg. F.

Nickel Solution:

Water	1 gallon
Double nickel salts	8 ozs.
Single nickel salts	4 ozs.
Common salt	2 ozs.
Boracic acid	2 ozs.

Prepare the solution in the order given using almost boiling water to dissolve the salts, then add the balance of the water cold to make up the necessary number of gallons of solution. Anodes, cast nickel 95-97%; voltage 3 to 5. We believe this formula will be best adapted for your purpose.—C. H. P. Problem 3,588.

FINISHING BRONZE TABLET

Q.—We are making a bronze tablet which is to be exposed to the weather. Our customer specifies a polished-face letter, and a dark oxidized background. Can this be done without electric treatment? If so, can you inform us what solution to use?

A.—There are two methods whereby you can produce the finish desired upon the bronze tablet, as follows:

The tablet should be cleansed and acid dipped in a mixture of equal parts of nitric and sulphuric acid to the acids applied to the surface of the plate and when bright immediately wash the acids away with a strong pressure of water applied with a regular hose. As soon as this has been done, then immerse the plate or tablet in boiling hot water and drain well. Previous to the operations outlined, prepare a solution consisting of hot water 160 deg. F.; 1 gallon; sulphuret of potassium or polysulphide 4 ozs.; aqua ammonia 26° ½ oz. Apply this oxidizing solution to the heated tablet until it becomes a dark steel bronze, then immediately wash off the excess with cold water, then with boiling water and finally dry with maplewood sawdust. You can proceed to polish the surface of the letters as may be desired, then remove all bronze dust by air pressure if you have it, then wax the entire plate with Johnson's floor wax or beeswax and turpentine paste. Wipe down with Canton flannel to remove the excess of wax. If the background is required in a lighter tone, then rub down with steel wool. Some tablet manufacturers apply a red metallic paint which is suitably darkened with drop black as a background for the tablets, then when the paint is dry and hard, the surface is polished as usual then waxed as outlined. The paint should not contain too much oil. It should have a dead lustre. Either one or the other method should answer your purpose.—C. H. P. Problem 3,589.

FINISHING SHEET BRASS

Q.—Could you please give us some advice on finishing sheet brass articles? Our trouble is that the brass is spotted and streaked before and after cleansing, with brown and other colored irregular spots. We would like to obtain a uniform finish either in the bright brass or in some other color, if it is uniform. At present, we are buffing to obtain a uniform surface.

A.—You have given us but very little detail whereby we can answer your question intelligently. There are three methods of finishing brass.

1. Acid dipped finish and lacquered.
2. Acid dipped finished, ball burnished with steel balls, soap bark solution and mechanical motion for the burnishing operation. Product finally lacquered.
3. Articles buffed under usual conditions, cleansed from buffing dirt by the aid of gasoline, benzine, benzole or tetrachloride of carbon. The last is non-inflammable.

After cleansing in either of above solvents, the articles should be dried out in maplewood sawdust, wiped with Canton flannel or by the aid of a slow running Canton flannel buff wheel and then finally lacquered by dipping, brushing or spraying.

Lacquers for either method can be obtained from manufacturers advertising in THE METAL INDUSTRY.

If you desire to finish your product by acid dipping, etc., we shall be pleased to furnish you the data. This also applies to ball burnishing. Only small articles can be ball burnished successfully. —C. H. P. Problem 3,590.

GOLD ON VULCANITE

Q.—We should like you to let us know the best way to gold-plate or gild on Vulcanite. We have no direct current, so please tell us what batteries to use.

We notice in THE METAL INDUSTRY under date of Feb., 1921, Deposition of metals in wax, but our copies were lost when we moved out here, therefore if metals can be deposited on wax, we can have hopes of doing it on Vulcanite, and we should like to know how to prepare solutions.

A.—To metallize vulcanite with gold you would have to proceed as follows:

1. Spray a mixture of very fine copper bronze powder, mixed with a celluloid lacquer as a base. The bronze powder lacquer so prepared must be fluid so that a thin even coating of copper bronze will result. It is advisable to apply two thin coats in the place of one heavy coat.
2. The articles so coated should then be allowed to dry thoroughly so the surface becomes hard.
3. The articles are then ready for copper plating. They should be wired up with soft copper wire to carry the current to the bronzed surface. The copper solution should be as follows:

Water	1 gallon
Copper sulphate	28 ozs.
Sulphuric acid	4 ozs.
Yellow powdered Dextrine	⅓ oz.

temperature, normal; voltage 2; anodes soft sheet copper; amperage 5 per sq. ft. of surface area which may be increased 10 to 15. After copper plating the surface sufficiently and lightly scratch-brushing silver or gold plating is readily accomplished. See formulæ in "Platers' Wrinkles." If you have no current producing factor, then it would be advisable to purchase a 2-volt storage battery with as great an amperage as possible. To maintain the current constant, keep constantly charged with a storage battery charger connected to a direct current lighting system, such as used in connection with radio storage batteries. The current might be excessive. You would then have to reduce the excess above that required for normal plated deposits with the usual plating tank rheostat.—C. H. P. Problem 3,591.

NICKEL ON KNIVES AND BUMPERS

Q.—We are encountering considerable trouble, and in fact more or less have always had this trouble. We have only a two lathe job shop. We do silver plating, and have quite a reputation, but on our knives, we have trouble making the nickel strike stay on. We are very careful in making the edges dull, flash in nickel, then silver. Please give us this information.

Also in plating radiator shells and bumpers is it advisable to plate in copper first, or flash nickel, and copper, and then nickel plate?

A.—You can readily solve your problem as follows:

1. The steel knives should be cleansed as usual, scoured with pumice stone and lime powdered, moistened with water to which is added a little sodium cyanide.
2. Wash thoroughly in water, then immerse in an acid dip composed of equal parts of muriatic acid and water. Again wash in water; immerse in a cyanide dip; water 1 gallon; sodium cyanide 8 ozs. Re-wash in cold water and nickel plate direct. The addition of 4 to 8 ozs. Epsom salts per gallon of nickel solution will be advantageous in striking the steel knives. After plating, silver strike as usual. Your silver strike will be improved by adding ¼ to ½ oz. caustic potash per gallon of solution. Use nickel anodes in the silver strike solution as the silver content must be kept low and the sodium cyanide high.

The maximum results are obtained in nickel plating automobile radiator shells, auto bumpers, etc., when the Tripoli deposits are applied nickel first, then copper, then nickel. The use of hot solutions 120 deg. F., give rapid heavy deposits with maximum resistance against rust and corrosion.—C. H. P. Problem 3,592.

PEROXIDE IN NICKEL SOLUTION

Q.—For a year we have been using peroxide made of sodium perborate and muriatic acid in our single nickel solutions to stop pitting, with good results. Owing to a change in our radiator casing, (a cap soldered on the top), the solution is giving us trouble. When peroxide is in solution, the nickel peels on the soldered part. If worked out until pitting starts, soldered part comes out nickeled. What is the cause?

A.—We do not believe that the use of sodium perborate which you convert into hydrogen peroxide by the aid of water and hydrochloric acid has any bearing on the soft solder which is used in soldering the cap to the radiator casing, and which you state has presumably caused the nickel to peel from the soldered joint. You state that you have been using the sodium perborate method for more than a year with excellent results in the control of hydrogen pitting. In our opinion your present trouble is due to an oxide that forms on the soft solder, as a result of the cleaning methods, which cannot be overcome unless friction is used to remove the oxide. We suggest that you use a mixture of sea-sand, pumice stone and hydrated lime, mixed with water and about 4 ozs. sodium cyanide per gallon of water used in preparing the pasty mass. After cleansing the shells as usual and washing in water, brush the soft soldered joint with the mixture, using a platers' hand brush for the purpose. Then re-wash the radiators quickly and plate as usual. If you follow these suggestions we believe your trouble of peeling of the nickel will be eliminated.—C. H. P. Problem 3,593.

PATENTS

A REVIEW OF CURRENT PATENTS OF INTEREST

1,601,436. September 28, 1926. **Metal-Pouring Device.** Max W. Goldberg, Port Washington, Wis., assignor to Modern Pouring Device Co., Port Washington, Wis.

A metal pouring device, comprising a portable frame, a vertically movable member carried thereby and having means for holding a container, a lever means for positively elevating the movable member with respect to the frame, a worm and worm wheel means for holding the movable member in adjusted position, and a hand wheel and brake means for controlling the lowering of the movable member.

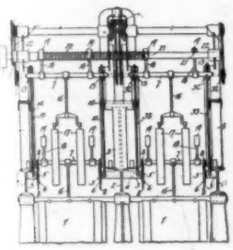
1,601,450. September 28, 1926. **Means for Supporting Core Bars in Flasks.** James R. McWane, Birmingham, Ala.

Means for supporting core bare in flasks comprising a bottom support, consisting of machined webs, and independent elements located within the flask and bearing on top of the core bars, properly spaced from the webs in the direction of the ends of the core bars, and adapted to exert a leverage to raise the latter at their central portions.

1,601,511. September 28, 1926. **Process of Cleaning Articles.** Frederick C. Schmutz, Matawan, N. J., assignor to A. P. Munning & Co. of New York, New York, N. Y.

The process of cleaning articles containing non-ferrous alloys or metals and carrying compounds to be removed, which comprises subjecting such articles to electrolytic action in a solution containing a soap and a reagent of a non-plating character which lowers the specific electrical resistance of water.

1,601,528. September 28, 1926. **Electroplating Machine.** Wesley F. Hall, Matawan, N. J., assignor to The Hanson & Van Winkle Company, Newark, N. J.



In an electroplating machine the combination, comprising, a tank, parallel longitudinal conveyers adjacent said tank, a transverse conveyer at right angles to the longitudinal conveyers, lifting conveyers operating in line with the longitudinal conveyers adapted to lift the work from one of the said longitudinal conveyers to a point above the tank and deposit it on the transverse conveyer and lowering conveyers operating in line with the other longitudinal conveyers adapted to lift the work from the transverse conveyer and lower it onto the said other longitudinal conveyer.

1,601,642. September 28, 1926. **Apparatus for the Electrodeposition of Metals on Wire or Narrow Strip.** Joseph Arthur Parker, Cwmbran, Wales.

Apparatus for electro-plating a coiled bundle of wire comprising a tank to contain plating solution, means for passing the opened out convolutions of a bundle of wire through the tank from one end to the other and revolving the bundle of wire substantially about its own axis, plate anodes extending transversely of the plating tank and spaced apart and between which each convolution of wire passes in its travel through said tank, means for preventing the convolutions of wire touching the anode plates, anode connections to said plates and cathode connections to the wire to be treated, substantially as described.

1,601,691-1,601,694 inclusive. September 28, 1926. **Electrolytic Deposition of Metals.** Matthew M. Merritt, Middleton, Mass., assignor to Industrial Development Corporation, Portland, Maine.

Apparatus and processes for electrolytic deposition using an insoluable anode and a moving cathode; methods of controling the concentration of solution.

1,600,257. September 21, 1926. **Manufacture of Copper Strips or Bars.** Charles K. Topping, Newburgh, N. Y., assignor to Chile Exploration Company, New York, N. Y.

The method of manufacturing metallic plater or the like which comprises forming a metallic starting blank, and progressively passing said starting blank through an electrodepositing apparatus in the course of which there is built up on said blank an electrodeposit of metal of a desired thickness.

1,600,355. September 21, 1926. **Coating Metal Pipe With Metal.** Spencer Otis and Wilson T. Herren, Barrington, Ill., assignors to National Boiler Washing Company of Illinois, Chicago, Ill.

A process for clearing ferrous articles for the deposition of metal thereon which consists in immersing the articles in a bath containing a caustic alkali and passing an electric current through the article and bath.

1,601,931. October 5, 1926. **Manufacture of Bodies From Metals Having a High Melting Point.** Anton Eduard van Arkel, Eindhoven, Netherlands, assignor, by mesne assignments, to General Electric Company, a corporation of New York.

A process of manufacturing ductile bodies of refractory metal, which consists in heating a single crystal of a metal in an atmosphere of a volatile and dissociable compound of the refractory metal at a temperature which is between that at which said compound dissociates and that at which the dissociated metal ceases to associate with the metal of said crystal in such a way that the latter grows larger while retaining its single crystal structure.

1,601,982. October 5, 1926. **Process for the Production of a Compound Metal.** Emilio Romanelli, Bloomfield, N. J., assignor to Westinghouse Lamp Company, a corporation of Pennsylvania.

A step in the process of producing a composite metallic body which consists in electroplating on a metallic core another metal of such thickness as to give to the composite body a predetermined coefficient of expansion.

1,602,995. October 12, 1926. **Nonferrous Alloy.** William A. Wissler, Elmhurst, N. Y., assignor to Haynes Stellite Company, a corporation of Indiana.

A non-ferrous alloy suitable for tools for the high-speed cutting of cast iron which contains at least 15 per cent of chromium, at least 10 per cent of another metal of the chromium group and at least 0.40 per cent of boron, with the balance principally cobalt.

1,603,435. October 19, 1926. **Method of and Means for Extruding Brass and Like Metal.** William R. Webster, Bridgeport, Conn.

An extrusion machine including a billet container having a bore therethrough, a tightly fitting die cooperating therewith, and a plunger to hold a billet within the container while producing relative movement between the container and die to thrust the die substantially through the container bore to extrude the billet.

1,604,618. October 26, 1926. **Electroplating Apparatus.** Joseph G. Swain, Akron, Ohio, assignor to the Firestone Steel Products Company, Akron, Ohio.

In an apparatus for electroplating small objects, the combination of a continuous conveyor belt, said belt being composed of a plurality of plates adapted to act as cathodes and adapted to support the articles, and baths for performing the electroplating operations through which the conveyor passes to carry the articles therethrough, for the purpose specified.

1,604,698. October 26, 1926. **Process of Treating Aluminum to Facilitate the Welding and Soldering Thereof.** Arthur Kirchhof, Meerane, Germany.

The process of treating aluminum for the purpose set forth, consisting in melting the aluminum and mixing powdered calcium carbonate therewith, and removing the scum from the molten aluminum.

1,605,432. November 2, 1926. **Alloy and Process of Forming the Same.** Hardy M. Fredriksen, Seattle, Wash.

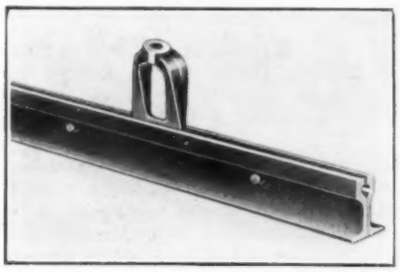
In a metal employed in electrical contacts, the combination of eighty-seven (87%) per cent silver, twelve (12%) per cent copper, and one (1%) per cent graphite, substantially as described.

EQUIPMENT

NEW AND USEFUL DEVICES, MACHINERY AND SUPPLIES OF INTEREST

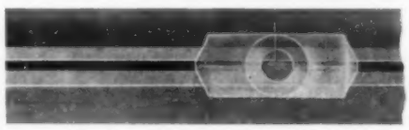
NEW MONORAIL

The American MonoRail Company, West 67th street and Pear avenue, Cleveland, is offering what is claimed to be a new and distinctive rail design for overhead hand-power monorail system. Features include a two-part rail, clamped together by means of bolts seated in slotted holes, suspending hangers assembled with the rail, and elimination of splice clamps. Unusual carrying capacity, permitting wide spacing of hangers and bridging of wide spans is claimed; and the assembly of the hangers as part of the monorail sections is stressed as materially reducing the cost of installation.



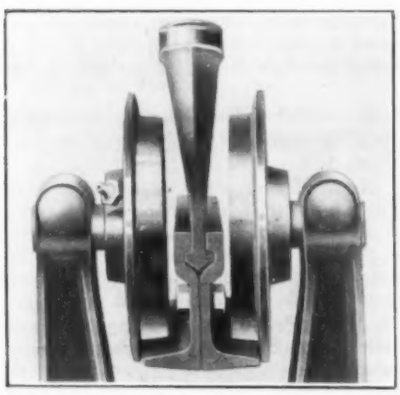
SECTION OF MONORAIL WITH HANGER

The construction of the rail may be noted from the illustrations. It consists of two twin sections rolled from railroad rail steel, the sections being bolted together, back to back, to form a solid rail unit. The disposition of the metal in the two sections is said to be such that the assembled rail is capable of bridging unusually wide spans and sustaining its load without deflection. The high vertical web of the rail is intended to provide maximum carrying strength, while the narrow overall width dimension of 2 in. facilities bending of the rail in the field to meet any layout requirement. Holes for the clamping bolts are slotted to relieve the bolts of shear stress as the sections are being bent. Standard bent sections are furnished for all regular curves and for irregular bends.



METHOD OF SPLICING MONORAIL

The standard spacing of the hangers can be quickly shifted to meet suspension requirements. Clamping the hangers inside the rail head instead of bolting them to the outside is stressed as permitting ample rail tread for the trolley wheels, and eliminating interference between the wheels and rail hangers. The hangers have a bearing surface of 3¼ in. inside the rail head, which eliminates possibility of rail "creeping."



MONORAIL HANGER IS CLAMPED INSIDE THE RAIL HEAD

An important feature of American MonoRail is the overlapping end connections. No splice clamps are required, and when the overlapping ends are bolted together they form a continuous monorail runway with no completely broken joints. Connecting joints being staggered on opposite sides of the rail, trolley wheels never cross joints on both sides of the runway at the same time. When the runway is erected, and overlapping ends are bolted in place, the splicing points are said to be as solid and rigid as any part of the system. The forged hanger supports at the splicing points prevents deflection of rails.

NEW ELECTRIC LAMPS

Many problems in securing good lighting have now been solved, it is claimed, by the recent decision of the Westinghouse Lamp Company and the General Electric Company, who manufacture practically all the incandescent lamps used in this country, to replace the forty-five varieties of lamps being produced at present by a new standard line consisting of five inside frosted lamps. To begin with, the new lamps are lower in price than the frosted lamps, and it is expected that the complete adoption of the standardization program will very greatly reduce the cost of lamps, thus materially cutting lighting costs.

The outstanding advantage of the new line of lamps from a maintenance standpoint is said to be the fact that they are frosted on the inside of the bulb, leaving the outer surface smooth. Thus instead of catching the dust and becoming stained and dirty through use, as do the present outside frosted lamps, the new lamps collect much less dirt and are very easy to clean.

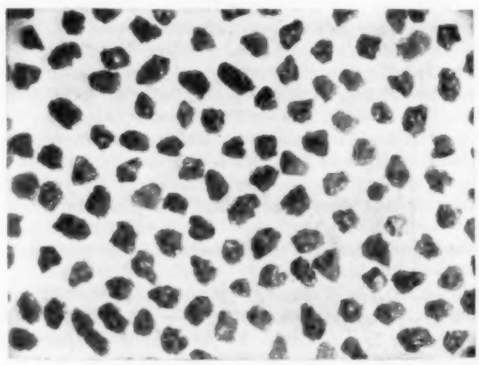
The new type of lamp is far superior to the clear lamp as far as diffusion of light is concerned, as it eliminates practically all of the glare of the clear lamp. This is very important in any lighting installation where it is possible from some positions to see the lamp bulb itself. Yet the inside frosting absorbs scarcely any of the light rays, making it much more efficient than the outside frosted or sprayed lamp. Particularly is this true after the lamps have been burned for some time.

The filament in the new line of lamps is the coiled type which was originally designed for "mill type" lamps, to withstand jars and vibration. Therefore the new lamps are much more rugged than those now being used for general lighting.

It was necessary in developing a standard type of lamp for all general lighting to design a bulb shape which could satisfactorily replace the several principal types now in common use, namely the straight side, pear shaped and round bulbs. For the purpose of efficiency in manufacture and in the designing of fixtures, it was decided to have all the new line of lamps in the same type of bulb, shaped like a drop of water.

ABRASIVE GRAIN

The General Abrasive Company, Inc., Niagara Falls, N. Y., has developed a new form of abrasive grain. This grain is said to be free from flat, silvery and pointed particles. The bulk weight of this solid type of grain is 8 per cent greater than that of the ordinary mixed shapes; consequently leaving less space between grains. It is stated that an increase of 26 per cent in strength is obtained over the typical mixed grains. Special durability is claimed for use in coarse hard grinding wheels and also in wheels used for polishing operations.



"POLYHEDRAL" ABRASIVE GRAIN

The distinctive features of this type of grain is "polyhedral" containing many phases or sides in comparison with ordinary abrasive grains.

BELKE ACID PUMP

In accordance with the new insurance rulings, prohibiting use of rockers for emptying acids from carboys, William Belke, president of the Belke Manufacturing Company, 2952 W. Van Buren street, Chicago, has placed on the market his latest invention, a hand pump for removing acid from carboys.

Every effort was made to design the pump for the greatest ease of operation and to allow pumping of small amounts as well as complete emptying of carboys. It is of the piston type, with the inlet in the bottom. The pump is set on the carboy box, with the inlet conveniently falling into the carboy. By pushing down on the handle, the acid is pumped out through the side, and into the receptacle. A slight pressure will release just enough for a cupful of acid and continued pumping will give a constant flow until the carboy is empty.

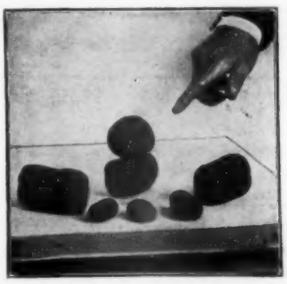
BELKE ACID PUMP

It is made entirely of lead and Monel metal for the parts exposed to acid. The hand pump is designed especially for platers' use and it is said to be as easy to operate as the oilpump now in use in plating rooms. A patent has been applied for.

The pump is about twelve inches high, and it is light enough so that it can be lifted up and carried around. The reasons for its existence are the new insurance regulations prohibiting platers from the tipping of heavy carboys to pour acid out. In this way acid was frequently spilled and touched the hands of the employee, causing severe burns.

POLISHING CHROMIUM PLATE

The stainless steel and chromium plate industry has become a tremendous factor in the commercial world today and the Zucker Sons' Company, Inc., of Elizabeth, N. J., has kept up with the advance by originating a polishing compound to meet the requirements of these manufacturers for a high and unusual lustre on these metals.



PIONEER GREEN CHROMIUM CROCUS

Their Pioneer Green Chromium Crocus, it is claimed, has proved to be the ideal product for the great majority of stainless steel and chromium plate concerns and for producing the desired black mirror finish at a cost of production much less than by any similar article on the market.

Pioneer Green Chromium Crocus is compounded and handrolled, which insures a uniform distribution of the abrasives with the fats. The raw materials entering into this product are said to be of the very highest quality and constant uniformity.

The Zucker Sons' Company, Inc., specializes in these materials, and they are prepared to make it in cakes of any size or shape to meet automatic buffing requirements.

EQUIPMENT AND SUPPLY CATALOGS

Silent Gears. General Electric Company, Schenectady, N. Y.

Crucibles. McCullough-Dalzell Crucible Company, Pittsburgh, Pa.

Aluminum Casting Alloys. Aluminum Company of America, Pittsburgh, Pa.

Aluminum Radio Shields. Aluminum Company of America, Pittsburgh, Pa.

Strong Aluminum Alloys. Aluminum Company of America, Pittsburgh, Pa.

Keystone Sprayer. Keystone Refractories Company, Inc., New York City.

H-Ion Comparator Set. La Motte Chemical Products Company, Baltimore, Md.

Machining Wrought Aluminum. Aluminum Company of America, Pittsburgh, Pa.

Ruggles-Coles Dryers. Ruggles-Coles Division, Hardinge Company, Inc., York, Pa.

Aluminum in the Chemical Industries. Aluminum Company of America, Pittsburgh, Pa.

Totally Enclosed, Fan-Cooled D-C Motors. General Electric Company, Schenectady, N. Y.

Industrial Traffic Manager. Policyholders' Service Bureau, Metropolitan Life Insurance Company.

Rolled Elliptical Heat Treated 99% Nickel Anodes. Hanson and Van Winkle Company, Newark, N. J.

Pneumatic Painting and Finishing Equipment. Willard C. Beach Air Brush Company, Harrison, N. J.

Labor Turnover Series 1. Policyholders' Service Bureau, Metropolitan Life Insurance Company, New York.

Raymond Roller Mills for Powdered Coal. Raymond Brothers Impact Pulverizer Company, Chicago, Ill.

Duplex System for Testing Diamond Wire-Drawing Dies. Robert Miller, 4725 Lancaster avenue, Philadelphia, Pa.

A. B. C. of Hydrogen Ion Control. An unusually attractive and informative catalog. La Motte Chemical Products Company, Baltimore, Md.

Wild-Barfield High-Temperature Electric Furnaces. Automatic and Electric Furnaces, Ltd., 173 Farrington Road, London, E. C. 1, England.

Corrosion and Decay of Alloys; and a brief outline of the non-corrosive metal Cataract, by E. G. Jarvis, Niagara Falls Smelting and Refining Corporation, Buffalo, N. Y.

Sand Cutting Machines for Foundries. A series of bulletins giving applications and general construction of these machines. Production Equipment Company, Cleveland, Ohio.

Applications of Metals, by E. G. Jarvis. A reprint of an article which appeared in THE METAL INDUSTRY. Niagara Falls Smelting and Refining Corporation, Buffalo, N. Y.

ASSOCIATIONS and SOCIETIES

REPORTS OF THE CURRENT PROCEEDINGS OF THE VARIOUS ORGANIZATIONS

AMERICAN ELECTRO PLATERS' SOCIETY

NEW YORK BRANCH

HEADQUARTERS, CARE OF J. E. STERLING, 2595—45TH STREET, ASTORIA, L. I.

The November meetings of the New York Branch A. E. S. were well attended. All arrangements were completed for the invitation meeting to be held Thursday evening, December 9, 1926, at the World Building, Park Row at 8:00 P. M. The speakers of the evening will be Oliver Sizelove of Newark Branch, recent winner of the best paper award on electroplating and C. L. Mantell, Electro-plating Director of Pratt Institute. An interesting evening is in store for all those attending.

The Committee for the 1927 Banquet which is to be held at the Aldine Club on February 19, 1927, consists of the following members: R. J. Lignon, chairman; A. Grinham, E. Schorr, W. Fischer, G. Dupbernell, E. Tannert, J. E. Sterling, T. Gardner and P. Morningstar.

CHICAGO BRANCH

HEADQUARTERS, CARE OF ROBERT MEYERS, 2432 WILSON AVE.

The Chicago Branch again cordially invites its friends to attend the fifteenth annual banquet to be held in the Red Lacquer Room of the New Palmer House, State and Monroe Streets, Chicago, Ill., on Saturday afternoon and evening, January 29, 1927.

An interesting educational session will be held at 3:00 P. M., which will be followed at 6:30 P. M. by a splendid dinner full of entertainment and the evening will be concluded by dancing. Do not forget the ladies.

For reservations and further information communicate with the secretary R. Meyers, at the above address. Tickets, $3.50 per person.

PHILADELPHIA BRANCH

HEADQUARTERS, CARE OF PHILIP UHL, 2432 N. 29th STREET

The 12th annual banquet of the Philadelphia Branch of the American Electro-Platers' Society was held on Saturday, November 20, 1926, at Mosebach's Hall. The technical session held in the afternoon included the following papers:

Address of welcome by George Gehling, President Philadelphia Branch.

A New Rust Proof Black Finish for Iron and Steel by Charles H. Proctor, Plating-Chemical Editor of THE METAL INDUSTRY.

Chromium Plating by Dr. H. Lukens, University of Pa.

Zinc Plating by Dr. Wm. Blum, Bureau of Standards, Washington, D. C.

Silver Plating Solutions by F. C. Mesle, Supreme President, American Electro-Platers' Society.

Nickel Anodes by George B. Hogaboom, Hanson and Van Winkle Company, Newark, N. J.

One hundred and fifteen members and friends attended the above session, the largest meeting ever held.

At the banquet 252 people were present, while the highest previous record was 165. One of the great surprises was the presentation of an engraved and framed testimonial to Philip Uhl in recognition of his fifteen years of faithful service as secretary-treasurer and past president of the Philadelphia branch. Mr. Uhl is also a past Supreme President of the A.E.S. He was made an honorary member of the Philadelphia branch. A striking fact in Mr. Uhl's record is the fact that in fifteen years he has missed only three meetings of his branch.

The Philadelphia branch has instituted a course in elementary and advanced chemistry for platers and assistant platers. Classes are held at the Kensington High School under Willard M. Scott and are open to members of the Philadelphia branch and their assistants. A report in this step was admirably presented to the meeting by George Gehling.

The meeting was by all odds the biggest and most inspiring ever held by the Philadelphia branch.

INTERNATIONAL FELLOWSHIP CLUB

HEADQUARTERS, CARE OF J. C. OBERENDER, ZAPON COMPANY, NEW HAVEN, CONN.

The International Fellowship Club will hold its next meeting and luncheon at 12:00 o'clock in the New Palmer House, State and Monroe Streets, Chicago, Ill., on Saturday, January 29, 1927. At this meeting the proposed and revised Code of Ethics will come up for discussion and the members are requested to attend this meeting.

A notice prior to this meeting will again be sent to the members with reservation card.

NATIONAL SAFETY COUNCIL

HEADQUARTERS, 108 E. OHIO STREET, CHICAGO, ILL.

The Fifteenth Annual Congress of the National Safety Council, held at Detroit October 25 to 29, attracted 5,000 people drawn from more than 20 industrial divisions. The Metals Section was represented by a large delegation. Many constructive methods were suggested and plans for future activities formulated.

TESTING MATERIALS SOCIETY

HEADQUARTERS, 1315 SPRUCE ST., PHILADELPHIA, PA.

French Licks Springs, Indiana, has been selected by the Executive Committee of the Society as the place of the 1927 annual meeting, thus taking the meeting of the Society to the Middle West for the first time in its history. The meeting dates are June 20-24.

Personals

GEORGE H. WADSWORTH

George H. Wadsworth is the president and general manager of The Wadsworth Core Machine & Equipment Company of Akron, Ohio, now celebrating the twenty-fifth anniversary of the invention and marketing of the Wadsworth Core Making Machine.

GEORGE H. WADSWORTH

Mr. Wadsworth was born in 1857 in the city of Chester, England, on the banks of the River Dee. At the age of 14 he was apprenticed at the Stafford Road Works of the Western Railway Company, Wolverhampton, as a fitter and turner, known in this country as a machinist.

In 1880, he came to the United States, settling in Cleveland, Ohio. The few machine shops that were then in existence were all on "The Flats" within a very small radius of each other and were equipped with a very limited amount of machinery; no milling machines, keyseaters, or boring mills. Work requiring machines of this type had to be sent either to Pittsburgh or to Buffalo. Owing to the limited equipment, muscle, brain, and the machinery at hand accomplished work then that would tax the machinist of today if he were deprived of his modern machines and tools. Training received under these conditions proved invaluable to Mr. Wadsworth in later years.

While in Cleveland, Mr. Wadsworth worked for the Lord & Bowler Company, the Cummer Engine Company, the Cuyahoga Steam Furnace Company, and the Walker Manufacturing Company, Cleveland firms who have since gone out of business. While with the Walker people he occupied the position of machine shop foreman, superintending the building of pulley molding machines and gear molding machines. This brought him in very close touch with the foundry and exceptional experience was gained in foundry machinery, molding machinery, and cupola practice. This company was a pioneer in this district in making this type of gears, which had a world-wide reputation for accuracy and for the exceptional grade of iron used in them.

From Cleveland Mr. Wadsworth went to Dayton, working for the Smith-Vaile Pump Company, the Buckeye Iron & Brass Company, and the National Cash Register Company, the latter of which occupied only two floors in the Calahan Power Building. While with them, Mr. Wadsworth was a tool maker and organized the first tool room for them.

From Dayton he went to Findlay, Ohio, where he remained through the oil and gas boom of 1890. Then he returned to Cleveland, accepting a position with the Hackney Hammer Company, but a short time later he went with the Avery Stamping Company as superintendent. He remained with them until 1894 when he accepted a position with the Falls Rivet and Machinery Company of Cuyahoga Falls, Ohio, later becoming superintendent of their entire plant. He stayed with this company about fifteen years. During that time the Spanish-American War took

place and he organized a department for making shrapnel shells for the Army and semi-armorpiercing shells for the Navy.

While with the Falls Rivet and Machinery Company, Mr. Wadsworth recognized the need of a machine for making stock cores, for which there was a growing demand. In 1901 he invented the first core making machine of the extruding type, suitable for either round or irregular cores. After successfully using this in his own foundry and seeing its possibilities, he decided to patent it, manufacture and place it on the market so that other foundries requiring stock cores could avail themselves of the advantages afforded by it.

In 1911 Mr. Wadsworth organized his own company and located at Akron, Ohio, and since that time he has been engaged in the improvement of his core making machine and the development of a full line of equipment pertaining to the core room.

Dr. **Birger Egeberg,** metallurgist of the Halcomb Steel Company, Syracuse, N. Y., has resigned to become metallurgist for the International Silver Company at Meriden, Conn.

Carl **F. Dietz,** president and general manager, Bridgeport Brass Company, Bridgeport, Conn., will address the Hartford, Conn., chapter of the National Association of Cost Accountants, on December 21, 1926, on "Visualizing Costs."

Henry **B. Cotter,** formerly employed as superintendent of the Cheshire, Conn., plant, of the Connecticut Brass and Manufacturing Company, has accepted a position as superintendent of the Glen Ridge, N. J., branch, of the Baltimore Brass Company, taking office September 1, 1926.

O. N. Yule, purchasing agent, Frost Manufacturing Company, manufacturers of brass goods, Kenosha, Wis., has been elected president of the Milwaukee Association of Purchasing Agents. This association has a membership of all the cities around Milwaukee, such as Sheboygan, Manitowoc, Waukesha, Racine and Kenosha and has 111 members on its roster.

E. M. Stephenson, for more than twenty years connected with the sales force of the Zapon Company, has recently joined MacDermid, Inc., Waterbury, Conn., in the capacity of special representative. "Steve," as he is frequently referred to by his many friends in the metal finishing trade, will continue to call upon the New England manufacturers in the interests of his new connection.

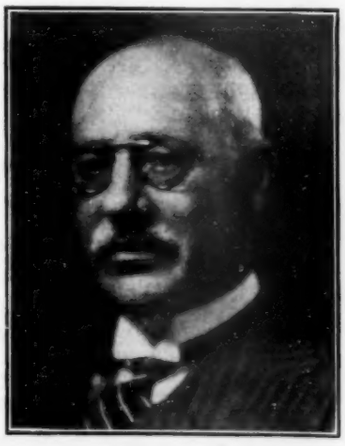
John T. Pratt has been elected president of the Chrome Alloy Tube Company, 26 Broadway, New York. **Ennis W. Bachman,** formerly in charge of operations at the company's Newark, N. J., plant, is vice-president in charge of operations. **Arthur V. Farr,** recently sales manager of the Roland Steel Company, New York, vice-president in charge of sales for the Chrome Alloy Company. **Louis C. Owens, Jr.,** secretary and treasurer. Recently, the company's headquarters were removed from the Newark plant to above address.

Mefford R. Runyon, recently appointed district sales manager for the New York Metropolitan District, comes to the Bridgeport Brass Company with wide experience in the brass, copper and bronze field. He was born and raised in New Jersey and educated at Rutgers as a chemical engineer. The World War called him over-seas for a period of 18 months during which time he had complete charge of medical supplies for a large base hospital. He returned to Rutgers and after graduation started in the wholesale hardware business. For four years following this experience, he traveled as a public accountant in South America, Panama and West Indies. He then took up the work of reorganizing one of the oldest brass and bronze manufacturing mills outside of Connecticut—the Benson Rolling Mills. In this work he was associated with Mr. Benson and G. J. Marcy, formerly superintendent of Rome Brass & Copper Company.

Obituaries

HOWARD J. ROWLAND

Howard J. Rowland, secretary and sales manager of the Rome Brass and Copper Company, Rome, N. Y., died at his home in Rome, N. Y., November 8, 1926, at the age of 64. The cause of his death was pneumonia. Mr. Rowland held, in addition to his official position with the Rome Company, the post of director, vice-president and member of the executive committee of the Copper and Brass Research Association.



HOWARD J. ROWLAND

He was born in Rome in 1862 and in 1879 went to work as office boy for the Rome Merchant Iron Mill, remaining there until 1888. He then became office and production manager of the Rome Iron Works which was later re-organized as the Rome Brass and Copper Company. In 1908 Mr. Rowland was made assistant secretary and sales manager and later was promoted to the position of secretary and elected to the board of directors. Mr. Rowland had numerous interests, including local clubs and societies. He leaves five children, his wife having died three years ago.

FREDERICK DANIEL BAKER

Frederick Daniel Baker, passed away on October 23 at his home in Bridgeport, Conn., in his 74th year. Mr. Baker was vice-president and a director of the Acme Shear Company of Bridgeport. He worked for a number of years in the brass mill of the Holmes and Griggs Manufacturing Company, New York. He came to Bridgeport in 1881 and went to work for the Rogers and Britton Company, later becoming traveling salesman for the Acme Shear Company. After subsequent promotions he was made vice-president of the company, and was instrumental in the organization of the Weed Chain Tire Grip Company with W. B. Lasher and H. D. Weed. Mr. Baker sold his interests in the company, now a part of the American Chain Company.

STUART C. SQUIER

Stuart C. Squier, who was identified with the zinc industry almost all of his life, died on November 6, 1926, at his home in Greenwich, Conn., at the age of 84. Mr. Squier was born in Rahway, N. J., and graduated from Yale University in 1866. He retired from active connection with the zinc industry when the amalgamation took place that created the New Jersey Zinc Company. He leaves a widow and six children. His brother Edwin M. Squier, vice-president New Jersey Zinc Company, whose death is noted in these columns, survived him by only three days.

E. M. SQUIER

E. M. Squier, vice-president New Jersey Zinc Company, died at his home in Rahway, N. J., on November 9, 1926, at the age of 74. Mr. Squier was a bachelor and had lived alone since the death of his mother twelve years ago.

Besides his business interests, which were numerous, he was active in local philanthropic work, supplying most of the funds for the Squier Memorial Community House of the First Presbyterian Church of Rahway.

FRANK A. HALL

Frank A. Hall was killed in an automobile accident October 19, 1926. He was sales engineer Dempsey furnace division, W. N. Best Corporation, New York, and previous to that was affiliated with F. J. Ryan & Company, and the Republic Flow Meters Company. Mr. Hall was a graduate of the University of Pennsylvania and was 37 years old. He leaves a wife and two children.

NEWS OF THE INDUSTRY

BUSINESS REPORTS OF THE METAL INDUSTRY CORRESPONDENTS

NEW ENGLAND STATES

WATERBURY, CONN.

DECEMBER 1, 1926

The **Scovill Manufacturing Company** capital stock has been increased from $17,700,000 to $22,125,000 by a transfer from the surplus account of $4,425,000 given to the present stockholders in the form of a 25 per cent stock dividend. At the same time, the existing shares have been split up on a basis of four for one at a par value of $25 instead of $100 a share. These two actions have resulted in the distribution to stockholders of five of the new shares for every one of the old.

E. O. Goss, president of the Scovill Manufacturing Company, as chairman of the Interstate Power Committee reported on the work of his committee at the second session of the New England conference, held this year, in Hartford. Industrial leaders from all over New England attended. Mr. Goss' report pointed out that the wide differences in existing laws of the respective states impede the transportation of power across state boundaries and urged removal of such barriers. The conference expressed the belief that it would be possible within a short time to arrive at an arrangement which will permit a unified power system for this region.

Damage estimated at between $20,000 and $25,000 was done by a blaze in storage buildings owned by the **Chase Companies** on Division street, last month. The buildings were rented by the concern to **Louis** and **Max Shaev**. The origin of the fire is unknown.

Fire, doing damage estimated at $2,000, broke out in the roof of the annealing building of the **Carroll Wire Company** on Huntingdon avenue, last month. **Vincent Carroll**, secretary and assistant treasurer of the concern said the annealing furnace may have overheated the woodwork of the building. The equipment was not damaged, the flames being confined to the roofing.

Edsel Ford, son of **Henry Ford**, was in Waterbury last month, visiting **Mr. and Mrs. Buell Hemingway** and expressed interest in the activities of Connecticut manufacturers in attempting to establish aerial transportation routes here. The success of commercial aviation in New England, he said, will not depend upon big companies, government subsidy or improved ships but upon the cooperation of every community along the proposed air lines and of every individual, in making the routes safe and easy to follow.

The **Colonial Air Transport, Inc.**, owned pricipally by local and state manufacturers, which has the contract for the air mail between Boston and New York, is now seeking the contract for the New York-Chicago mail route. It has already put in its bid. The directors of the concern will hold a meeting this month to act on a proposal to increase its capital from $1,000,000 to about $4,000,000.

The Waterbury exhibit at the American Institute of New York, last month, has been brought here and is now being displayed at the **Mattatuck Museum**. It shows articles manufactured by all the local plants and shows the progress made in the brass industry since its beginning here. In one single panel, a running story, illustrated with the articles, themselves, shows how a typical family, from the time it arises in the morning until it retires at night continually uses articles made in Waterbury. This exhibit was described in THE METAL INDUSTRY for November, 1926, pages 482-483.

Industrial accidents in this section of the state show a large increase over the same period of 1925 according to **Frederic M. Williams**, local compensation commissioner. This year, to date, 4,913 have been reported compared to last year's figure of 3,593 for this period. These figures include only such accidents as force a worker to remain away from employment for over a day.

The state has formally accepted the gift of **Black Rock Forest**, consisting of 2,232 acres of woodland on the Naugatuck River north of Waterbury. Local manufacturers donated a large part of the lands and much of the money used in making purchases of land. The **Chase Companies, Inc.**, alone, gave 656 acres.—W. R. B.

BRIDGEPORT, CONN.

DECEMBER 1, 1926

William C. Durant, head of **Durant Motors** and the **Locomobile Company** of this city, had a two-day conference with officials of the local plant last month for the purpose of discussing a forthcoming new model. He denied the report that he is negotiating for a sale of the Locomobile Company to the General Motors Company.

The board of directors of the **General Electric** Company came here on a special train, last month, to inspect the local plant of the concern. **Owen D. Young**, chairman of the board, headed the party and **E. J. Pearson**, president of the New Haven road, and some of the directors of the road accompanied it. With the exception of one, all the power producers used on the trip were products of the General Electric Company. Three different types of electric locomotives, a gas-electric car and a gas-electric bus were used. **Mayor F. W. Behrens, Gov. John H. Trumbull** and **Walter Lashar**, president of the **American Chain Company** of this city, welcomed them.

Frederick M. De Rick, 57 years of age, of 197 Freeman street, a foreman of the **Acme Shear Company** of this city, has received a Carnegie hero medal for his rescue of a Waterbury girl from drowning, last summer.

Employees of the **Bassick Company** here are being offered shares of stock in the **Stewart-Warner Company**, of which the local concern is a subsidiary, it is announced by **Otis D. Covell**, assistant treasurer of the company. The stock is bought at the rate of $1 a share down, the rest to be taken out of the employee's pay each week. Dividends paid on the stock are credited to the employee as an installment on the stock. The company will also pay each purchaser $1 this year and each of the next four years for each share bought as part of its assistance to the employees in securing the stock. The company has no shares at hand and has to purchase them in the open market.

The **Bullard Machine Tool Company** of this city has sold an issue of $600,000 5-year debentures to **E. B. Merritt & Company** of this city. The proceeds will be used in part for the retirement of the entire issue of the company's first mortgage 6 per cent bonds.—W. R. B.

TORRINGTON, CONN.

DECEMBER 1, 1926

The plant of the **Graham Manufacturing Company** was damaged by fire on the night of November 12. The plating room was completely gutted and the storeroom slightly damaged. The loss to buildings and contents was estimated at $5,000. The origin of the fire, which started in the plating building, is not known.

F. H. Griffiths, president of the **Turner & Seymour Manufacturing Company**, has been re-elected president of the Torrington Y. M. C. A.

Application was made in the superior court for this county during the past month that the appointment of **William W. Gager** of Waterbury as temporary receiver for the **Bantam Ball Bearing Company** of Bantam be made permanent. It was contended that the company had been making steady profit during Mr. Gager's receivership and that it ought not be interrupted. Recommendation also was made that the offer of $11,000 for four houses owned by the company be accepted. Decision was deferred.

Torrington's central district tax is now being collected. The biggest single tax bill was that of the **American Brass Company**, $42,086.

Through the efforts of Torrington's city board of finance, made up of manufacturers and other business men who serve without remuneration, the city debt has been reduced from $1,441,665.20 to $715,759.78 within a period of three years, according to a report just made public.

The additions to the **Progressive Manufacturing** plant and the **Severin Manufacturing** plant have been completed and are now being used. Big additions to the **Fitzgerald** and **American Brass** plants are nearing completion.

Industrial conditions in Torrington continue steady, with practically all plants operating on full time and plenty of work for everybody. Manufacturers for the most part are highly optimistic over the outlook for the coming year.—J. H. T.

NEW BRITAIN, CONN.

DECEMBER 1, 1926

That there possibly is a slight let-down in the local industrial plants, or at least some of them, is obvious from the action of the officials at the **Stanley Works** where a more or less general wage reduction, in most instances averaging 10 per cent, has been inaugurated, together with a slight reduction in the working force. **Clarence F. Bennett,** president, has issued a statement denying that the reduction in wages has been general.

In none of the other concerns are there any signs of a let-down and a survey shows that conditions generally are very good here. There is a slight surplus of common labor, but as far as the skilled trades are concerned there seems to be employment for all permanently located here.

The manufacturing and investment interests of the Hart & Cooley company have been divorced by vote of the stockholders and the capital stock of the corporation increased from $990,000 to an even million. The **Hart & Cooley Manufacturing Company** will be incorporated to handle the manufacturing interests of the concern and the now existing company will hold stock in this and other concerns in which investments have been made over a period of 16 years.—H. R. J.

PROVIDENCE, R. I.

DECEMBER 1, 1926.

At no time since the abnormal industrial activities of the pre-war period have business conditions in the metal trades of this city and vicinity been so generally good as at the present time. The year opened encouragingly and has shown a gradual improvement ever since. Building operations have never been so large, or so numerous in Providence as now and there is every indication that they will remain active for another year, at least.

But the most encouraging and noticeable improvement is to be seen in the jewelry and kindred lines. In these there has not only been a healthy increase but the indications for the next year are unusually bright. This industry has been undergoing a very material change during the past couple of years and the old fashioned conservatism is rapidly disappearing.

The **P. & W. Company,** 258 Benefit street, Providence, has announced that they are distributors and local representatives in Rhode Island and Massachusetts for the **Onyx Chemical Company,** 131-133 West Seventeenth street, New York city, to handle its entire line of compact powders and rouges. The owners of the P. & W. Company are: **Earl E. Whalen,** formerly of **M. J. McEvoy & Company, Inc.,** and **Edward B. Palmer,** formerly connected with **J. Briggs & Sons Company,** gold and silver platers.

The **Standard Novelty Company, Inc.,** of Providence, has been incorporated under the laws of Rhode Island, to manufacture and deal in jewelry and novelties, with a capital stock of 50 shares of common stock, without par value. The incorporators are: **Orrin E. MacCue,** of Warwick, **Morris Berick,** of Pawtucket, and **Frank H. Bellin,** of Providence.

The **Eagle Cornice Company,** 312 Blackstone street, Providence, has the contract for all the sheet metal work and roofing for the new building at the St. Andrew's Industrial School, in West Barrington, R. I.

The **Rhode Island Wire Works, Inc.,** 43 Willard avenue, Providence, have received the contract from the **J. A. Foster Company** for elevator fronts in their building at Weybosset and Dorrance streets. They also have the contract for elevator fronts for a new business block in Cambridge, Mass.

William G. Hillman has recently started in business under the firm name of the **William G. Hillman Electro-Plating Company,** at 140 Chestnut street, where he has facilities for all lines of work.—W. H. M.

MIDDLE ATLANTIC STATES

ROCHESTER, N. Y.

DECEMBER 1, 1926

With the month of November fast drawing to a close business prospects are not so bright as in the picture painted earlier in the fall. In all sections of the city there appears to be a marked let-up, and in but one big plant there are indications that operations will not be curtailed during the coming winter. Owing to the fact that the **General Railway Signal Company** was successful in obtaining a large number of equipment orders, of generous size, late in the summer and in September, the big plants in Lincoln Park bid fair to be busy until well into 1927. It is quite probable that the General Railway Signal plants will be operating at full speed for an indefinite period.

In the brass foundries and plating works, however, industry hums, owing to the extensive building program that prevails in Rochester. Managers of brass foundries say they have enjoyed lively business since last February.—G. B. E.

NEWARK, N. J.

DECEMBER 1, 1926

Title has been taken by the **Hanson & Van Winkle Company** to the property conducted for many years by the **Atha Steel Works.** The new owners manufacture electro-plating and polishing equipment and supplies and make low voltage generators and dynamos. The property will be used for the chemical department and laboratories. It will add 100,000 square feet to the plant.

The **Rankin-Kennedy Foundry Company, Inc.,** 103-111 Gotthart street, has been sold to the **M. H. Detrick Company,** of Chicago, with offices in New York City. **R. D. Foltz,** vice-president of the Detrick Company, said that the new corporation will carry on the Rankin Foundry business in connection with making castings for its own company.

An equity suit to have a receiver appointed for the **Eagle Radio Company,** makers of Eagle neutrodyne radio receivers, of 14 Boyden street, has been brought by Charles R. Payne, of Brooklyn, in the United States District court.

Cop-Cor Manufacturing and Sales Corporation, 283 Central avenue, Jersey City, has been incorporated to manufacture metal strippings.—C. A. L.

TRENTON, N. J.

DECEMBER 1, 1926

The metal industries in Trenton are holding their own and the prospects are very good for a busy winter. The **Skillman Hardware Manufacturing Company** reports that while conditions have been better there are plenty of inquiries for the winter and spring market. The company has enough orders on hand to keep the plant busy during the winter without laying off any help. **William G. Wherry,** president of the company, says he feels optimistic over the future. The **Trenton Emblem Company** is also busy at this time. The **Trenton Brass and Machine Company** is having a one-story steel building erected. The **John A. Roebling's Sons Company** has contracted for the erection of an office and store building. The building will be 140 by 62 feet and will cost $25,000. The **Magnetic Pigment Company** has also let a contract for an addition to the present structure on Cass street to cost $18,000.

Oliver O. Bowman, formerly head of the **Jordan L. Mott Company,** who has been a patient in the McKinley Hospital since June 11, 1925, when he sustained a fracture of the hip in a fall, is reported to be very ill. Mr. Bowman is nearly 90 years old. He fell while passing through a revolving door at the Broad Street Bank, where he is a director.

John B. Aurer, 57 years old, owner of a knob manufacturing factory here, dropped dead recently while in the office of the **Skillman Hardware Manufacturing Company.** His concern manufactured door knobs for the Skillman Company. Mr. Auer, stricken with paralysis some time ago, had been lame ever since.—C. A. L.

PITTSBURGH, PA.

DECEMLER 1, 1926

Business developments in the metal industry throughout Western Pennsylvania and the Trii-State District, has been somewhat spotty, so there remains about the same basis as a month ago for difference of opinion with reference to the economic trend. However, a survey of business conditions made by the Pittsburgh Association of Credit Men, shows that the general trend is much better, particularly in mining and manufacturing, according to Secretary L. I. MacQueen.

Hardware in seasonable lines, including stoves and heating apparatus, is fairly active, but builders' hardware lags. Construction work is considerably below that of last year, and building material is less active. Machinery and machine tools has been somewhat better in the past week, and sentiment in the industry is better than in the latter par of October. Radio equipment is moving more freely. October sales in radio industry were larger than in September, and from 15 to 25 per cent higher than they were in the corresponding month of last year.

Sanitary supplies and heating equipment manufacturers' report business very fair.

The Lorain, Ohio, plant of the **National Tube** Company, reported to be operating at about 85 per cent, a loss of about 8 per cent from former production schedules.

On November 13, it was reported that **Charles M.** Schwab, had made a visit to Franklin, Pa., in connection with the expansion of the two plants of the **Chicago Pneumatic** Tool **Company** there.—H. W. R.

MIDDLE WESTERN STATES

INDIANAPOLIS, IND.

DECEMBER 1, 1926

The **Thomas & Skinner Steel Products Company,** of Indianapolis, Ind., has purchased the property formerly owned and operated by the **Pioneer Brass Works** in Indianapolis, and will remove its factory to the new location shortly, according to an announcement by **J. R. Thomas,** president of the company. It is understood the purchase price was $58,000. It was bought from **John W. Kern,** receiver for the company. The property has a frontage of 300 feet in Twenty-third street and a depth of about 325 feet. On the property is a switch track and a modern brick and steel factory building only five years old, with 30,000 feet of floor space.

After being idle for more than a year, plant No. 2 of the **Atlas Foundry Company,** Marion, Ind., has resumed operations with an initial force of 100 men. Plant No. 1 has been working night and day in a futile attempt to keep production even with the order files.

The **Delaware Brass and Aluminum Company,** manufacturers at Muncie, Ind., of brass and aluminum products, is constructing an addition to the plant and also is making repairs.

Plans are being drawn for the construction of additions to the zinc plant of the **Grasselli Chemical Company** at Terre Haute, Ind. The new addition will be of brick and will cost about $50,000.

Officials of the **American Foundry and Equipment Company** at Mishawaka, Ind., recently entertained members of the Mishawaka Chamber of Commerce and the various luncheon clubs with inspection tours of the new plant. Two afternoons were devoted to the inspection. Guides were provided and those who did not have transportation in their own cars were provided that also.—E. B.

DETROIT, MICH.

DECEMBER 1, 1926

"Have it nickel-plated," is the dictum of **Henry Ford** which, to a large extent, is responsible for much of the fine appearance of everything about the Ford plants. He believes that the habit of cleanliness is encouraged by the appearance of nickel on levers, gauges and other metal parts of machinery and equipment which are frequently handled and where rust is likely to make its appearance. The place where all this is most in evidence is in the cabs of the D., T. & I. railroad locomotives. The entire boiler heads are brightly burnished and every lever, valve handle, etc., is kept shining like new. Mr. Ford claims this wholesale nickel-plating enhances the general appearance of equipment and serves as an ever-present motive for maintaining it at a high standard, rough usage and neglect being more readily detected. The D., T. & I. railroad plating department adjoins the locomotive shops at Fordson, a suburb of Detroit, and is equipped to handle a large volume of work required to maintain the standard required.

The brass, copper and aluminum industries in Detroit are holding up fairly well notwithstanding the general decline that is noted in most other branches of manufacture. In Detroit the automobile has a decided effect on a varied line of industry, this being particularly true of all metals.

Accessory manufacturers are holding production to requirements. Most of them are operating on part time. In a general way, however, the industry in the Detroit and Michigan territory has had a fairly successful year, but without much in the way of boom conditions in evidence. No one is making positive predictions for the first quarter of the new year. It is expected, of course, there will be plenty of business, but just how extensive, that is another question, but little, if any anxiety is expressed.

Building hardware and plumbers' supplies are in rather quiet demand and in fact have been in this condition during the greater part of last summer and the closing weeks of the year. Manufacturers are producing only for immediate requirements.—F. J. H.

CHICAGO, ILL.

DECEMBER 1, 1926

The **Lake Shore Auto Specialties Company,** 612 North Michigan avenue, has been granted a charter with a capital of $10,000, to manufacture and deal in automobile specialties and accessories. The incorporators are: Robert J. Thorn, Edward Porter and J. L. Mount. The correspondent is Emmett J. Cleary, 11 South LaSalle street.

The **Argo Chevrolet Company,** 8215 Eberhardt avenue, has been granted a charter to manufacture and deal in automobiles, parts and accessories with a capital of $10,000. The incorportors are: Ralph K. Minteer, Faye C. Minteer and Dwight E. Whitehill. The correspondent is Edmond F. Dodge, 318, 6304 Cottage Grove avenue.

The **Motor Products Manufacturing Company,** 1325 Tenth street, East Moline, Ill., have been granted a charter, to engage in experimental and development work in connection with auto accessories, parts and other products, with a capital of $25,000. The incorporators are: E. H. Wilson, Raymond Henry and F. E. Bradfield. The correspondent is Kenworthy, Dietz, Shallberg, Harper and Sinnett, People's Bank Building, Moline, Ill.

O. W. Roberts and Company, manufacturers of casement hardware, have leased for a period of five years the entire one- and two-story building at the north west corner of Kinzie and Woods streets for a term rental of $24,625.—L. H. G.

OTHER COUNTRIES

BIRMINGHAM, ENGLAND

NOVEMBER 15, 1926

Most of the Birmingham metal and hardware trades are carrying on in spite of fuel difficulties which hamper production. Full time is worked in nearly all departments although gas and electric authorities have warned customers to exercise the strictest economy in the use of light, heating and power. The metal bedstead trade, for example, is practically working at the normal rate although the acute famine in the pig iron industry has almost stopped the supply of this material. An expanding business with foreign countries is carried on by the

makers of bedstead tubes and the decidedly low level of prices will, it is believed, effectually meet German and American competition.

In the silver and electric-plate trades an improvement is at last discernible and a number of firms are warking overtime. The Christmas business is now in preparation and skilled labor for the work is difficult to obtain as large numbers of men have drifted into the motor, cycle and other industries in order to obtain jobs. Silver ornaments, however, are likely to be fashionable once more and work in this department is expanding. Export demand keeps up satisfactorily.

Electrical equipment makers for lighting and power are very busy, although output is necessarily curtailed owing to shortage of metals and fuel. The lack of coal has given a spurt to the installation of artificial heating in the form of gas fires and electric radiators, and at this time this trade has plenty of orders in hand.

The brass foundry trades are not quite so busy as they were. Housing contracts have been held up by a shortage of bricks, and the makers of steam and water fittings have experienced a falling off in the home and export markets. Among those firms catering for the motor trade a fillip has been given by the motor show at Olympia which is reported to have done record business. The full effect of this, however, will be felt during the next few weeks. Fair business is in hand amongst rollers of copper.—J. H.

Business Items—Verified

The **Phoenix Brass Foundry, Inc.,** 360 Coit street, Irvington, N. J., has filed plans for a one-story addition to be used for additional core department needs.

Contrary to a report published in another journal, the **Sangamo Electric Company,** 183 George street, Toronto, 2, Canada, has not had any fire in its plant.

The **Elwell-Parker Electric Company,** Cleveland, Ohio, has placed contract with the J. Boldt Construction Company, for a two-story brick and concrete addition.

The **Glen Ridge, N. J.,** branch of the **Baltimore Brass Company,** formerly known as the Benson Rolling Mills, Inc., is now manufacturing a full line of brass, nickel, silver and all grades of bronzes.

James A. Glass, 99 Bedford street, Boston, Mass., manufacturer of metal grille work, office partitions, etc., has leased property at 214 High street. The works have been removed to the new location.

The **Metals Coating Company,** 497 North Third street, Philadelphia, Pa., has plans under way for a one-story addition, 30 x 100 ft. to its five-story plant, to cost about $40,000. Richard L. Binder is president.

Charles H. Abbott, Inc., Hartford, Conn., has been succeeded by the **Hartford Steel Ball Company.** The company specializes in steel balls for bearings, steel burnishing balls and metallic burnishing materials.

Harry W. Holt, Charles W. Eggenweiler and **William T.** Bohn are the three new vice-presidents of the **Bohn Aluminum and Brass Corporation,** Detroit, Mich. This firm operates a brass, bronze and aluminum foundry.

The **Standard Calorimeter Company,** Moline, Ill., has filed plans for its one-story foundry, 60 x 120 ft. The company specializes in the manufacture of Illium, a nickel-chromium non-corrosive alloy. This firm operates a brass, bronze and aluminum foundry.

The **Art In Bronze Company,** 1782 East 37th street, Cleveland, Ohio, is having plans prepared for the construction of a two-story, 34 x 70 x 125 ft. foundry, at 1621 East 41st street. Estimated cost $40,000. This firm operates a brass, bronze and aluminum foundry.

Sloan Valve Company, 4300 West Lake street, Chicago, Ill., manufacturer of plumbers' supplies, awarded contract for the construction of a three-story, 100 x 135 ft. addition to factory at 4340 W. Lake street. Estimated cost, $100,000. This firm operates the following departments: bronze foundry, brass machine shop, tool room, plating.

The **Hagerstown Bronze and Aluminum Company,** Hagerstown, Md., has leased the Moore Engineering Company foundry and equipment for the purpose of manufacturing brass, bronze and aluminum castings of the jobbing nature, and also expects in the near future, to install equipment for hot galvanizing, and will be in the market for galvanizing equipment. This firm operates a brass, bronze and aluminum foundry.

The **Millard F. Wilfong Iron Works Company** has been liquidated. This company made galvanizing kettles and steel plate annealing boxes. The **Durable Products Company,** 111 South 15th street, Philadelphia, Pa., has arranged to keep together the vital part of the organization and is now making galvanizing kettles. **William Hill** will take immediate charge of the manufacture.

Botfield Refractories Company, Philadelphia, Pa., has appointed the following concerns as distributors for their product, Adamant fire brick cement: Curtis Supply Company, Inc., Washington street at Perry, Buffalo, N. Y.; the Waldred Supply Company, 707 Cherry street, Des Moines, Iowa; South Side Foundry and Machine Works, Charleston, W. Va.; Empire Machinery and Supply Corporation, 409 Water street, Norfolk, Va.

The **Metric Metal Works,** Erie, Pa., are building a brass foundry, 96 x 200 ft., on property belonging to the company on the corner of 9th street and Payne avenue. The floor space of present foundry, which is attached to the factory, will be occupied as a machine shop; in fact the demand for more machine shop floor space that would tie up with present factory operations necessitated the building of a new brass foundry. This firm operates a brass foundry.

Edison Electric Appliance Company, 5600 W. Taylor street, Chicago, Ill., manufacturer of electric heating and cooking devices, has acquired the former plant of the Vitanola Talking Machine Company, at Cicero, Ill., comprising three main buildings with total floor area of 190,000 sq. ft. It will be used for the present for manufacturing electric appliances and heavy duty equipment. The Taylor street plant will be used exclusively for the manufacture of Hotpoint electric ranges. This firm operates the following departments: tool room, grinding room, brazing, plating, japanning, stamping, tinning, soldering, polishing, lacquering.

The **General Electric Company** has announced a reduction averaging 5 per cent in the prices of distribution and small power transformer, 500 kv-a. and less, 73,000 volts and below, effective November 8. This is the fifth reduction that has been made by the General Electric Company on this class of material since 1920. A reduction in prices on its general purpose motors, amounting to 5 per cent on most lines and 10 per cent on commonly used sizes of squirrel cage induction motors, has also been announced. The motors affected by the new price levels include both a.-c. and d.-c., constant and variable speed general purpose motors, from one to 200 horsepower.

The **Penn Brass & Copper Company** was incorporated under the laws of Pennsylvania in August, 1923, for the purpose of manufacturing seamless brass and copper tubes. They are confining their efforts to the manufacture of seamless brass and copper tubes, having a range of sizes from 5/64 in. OD No. 30 B. & S. Gauge up to and including 1 in. OD No. 13 B. & S. Gauge and have a capacity of about 120,000 pounds of finished products monthly. Present officers are: **E. S. Roach,** president and treasurer; **K. W. Wilks,** vice-president and general manager, and **A. E. Halstead,** superintendent. The first two were formerly connected with the old **Erie-Buffalo Tube Company** of Erie and Mr. Halstead came from Providence, R. I.

The **Pittsburgh Lacquer & Chemical Company** was incorporated with a capital of $50,000 on December 30, 1925, and has a Pennsylvania charter. The company purchased the plant and real estate formerly owned by the **Keystone Metals Reduction Company** of Cheswick, Pa. This property consists of six acres of real estate, a number of buildings and has ideal railroad facilities. The company manufactures lacquers of all kinds such as wood, metal, automobile, crystal and crackle, etc., and when all equipment is installed, will be able to produce in the neighborhood of over 100,000 gallons of various lacquers and thinners per month. The officers of the company are: **Ralph W. Harbison,** president; **Karl B. Thews,** vice-president and general manager; **M. H. Bowman, Jr.,** secretary and treasurer; **E. A. Costello,** sales manager.

Industrial and Financial News

INCORPORATIONS

The **Willard C. Beach Air Brush Company,** Second and Warren streets, Harrison, N. J., has been incorporated for 100 shares of no par value stock. The company manufactures a complete line of pneumatic painting equipment both for products finishing work and maintenance painting work. This firm operates the following departments: brass machine shop, tool room, japanning, soldering, polishing, lacquering.

The **Pittsburgh Die Casting Corporation,** Swissvale, Pa., has been formed to take over the business of the Pittsburgh Die Casting Company and will let contracts immediately for new buildings and equipment. White metal and aluminum die castings are manufactured. H. F. Messersmith, formerly works manager of Equitable Meter Company, Pittsburgh, is president and general manager; H. G. De Van, secretary, and F. N. Townsend, treasurer. This firm operates the following departments: tool room, grinding room, casting shop, soldering.

SCOVILL COMPANY INCREASES CAPITAL

Stockholders of the Scovill Manufacturing Company, Waterbury, Conn., approved an increase of capital from $17,700,000 to $22,125,000. The $4,425,000 increase was in form of stock dividend. Shares of the company are increased from 177,000 to 885,000, decreasing the par value from $100 to $25 by a proportional multiplication of shares, four for one and one share extra as a stock dividend.

DURIRON COMPANY CONFERENCE

A technical sales conference of the Duriron Company, Dayton, Ohio, was held November 3, 4 and 5, in New York, all sessions being held in the breakfast room of the Hotel Belmont.

The widely varied field of applications of Duriron and Alcumite, and what they both mean in these fields, was the program.

In attendance at all sessions were a number of men high in the councils of the chemical world, including several who are retained consultants of this company.

Among these may be mentioned Dr. Colin G. Fink of Columbia, Dr. Kirkpatrick and Mr. Tyler of "Chem. & Met.," Doctors Weiss and Downs, Mr. Bregman of THE METAL INDUSTRY, Mr. W. M. Corse and others.

Mr. Schenck, president of the company, presided at all sessions.

OAKITE CONFERENCE ON CLEANING

The field service men, technical staff and executives comprising Oakite Products, Inc., held its Tenth Annual Conference in the general offices at New York, December 6-10, 1926. On this occasion the field service men came from various parts of the United States and Canada to exchange experiences and ideas and to hear and discuss technical papers on various phases of cleaning.

Eighteen different technical papers were presented covering a wide range of subjects among them being, "Oakite Cleaning Materials in the Petroleum Industry"; "Oakite Service in Power Plants"; "Oakite in Railroad Shops"; and other papers dealing with Oakite methods employed in dairies, bottling plants, laundries, electrotyping and lithographing plants, textile mills, etc.

December, 1926, will mark the eighteenth year of the business life of Oakite Products, Inc. From a small group of three men in 1909, it has grown into the present large organization.

INSTITUTE OF PEACEFUL ARTS

The city of New York may in the near future, grant a 20-acre site for the Museum of the Peaceful Arts, a fund for which was left by the late Henry R. Towne. This is expected to develop into one of the leading industrial museums of the world.

LEAD AND COPPER SUBSTITUTES

A group of Lyons merchants and manufacturers has recently urged the French Government to foster a movement for the substitution of domestic products for lead and copper, metals which France must largely import. The use of iron tubing in the place of lead pipes for water and gas installations and of polished iron, aluminum, white metal, and enameled materials for the articles of interior equipment usually made of copper and brass are among the suggestions made.—Foreign Trade Notes.

TIN PLANT IN CANADA

Great Britain controls the world's tin market, the Tariff Board of Canada was informed, and United States smelters operate at a disadvantage. For that reason a company which is said to be backed largely by United States capital proposes to establish on the Saguenay River near Chicootim a $750,000 smelter capable of supplying Canada's present requirements of tin, namely 2,200 tons a year.

But in return they are asking tariff concessions from Canada which would remove tin from the "free" list and impose a specific duty of 6, 7½ and 9 cents per pound in blocks, pigs or bars, when of a class or kind manufactured in Canada. The company would be in a position to bring ores from Bolivia, which can enter Canada free of duty.

The Tariff Board will consider the application and make its recommendation to Hon. James Robb, Minister of Finance.—New York Times.

NEW ALUMINUM STREET CAR

It has been announced that a street car built in Cleveland with aluminum alloys displacing iron and steel in the principal structural parts, was recently exhibited at the annual convention of the American Electrical Railways Association held in Cleveland, Ohio.

The car is built of Duralumin, an aluminum mixture of 4.5% copper, .75% magnesium, and 1% manganese. The weight of the car is 34,000 pounds, 8,000 pounds less than the ordinary steel trolley of the same size.

The decrease in weight, according to officials of the Cleveland Railway Company, builders of the car, will result in a saving of 15% in the consumption of electric power.

FOREIGN ALUMINUM TRUST

It has been reported that an organization has been effected of German, French, English and Swiss aluminum producers to govern production and export markets. Foreign cables state that the object of this combination is to combat the American producer but this is denied in numerous places.

It is reported also that German aluminum production is on the increase, estimates for 1926 being about 20,000 metric tons.

Another report states that the above combination has agreed to stabilize the price of aluminum for two years at £105 per ton, (about 29 cents per lb., including the tariff, laid down in the United States), thus making it non-competitive with American aluminum which is quoted at 27c.

METAL STOCK MARKET QUOTATIONS

	Par	Bid	Asked
Aluminum Company of America	..	$70	$71½
American Hardware Corporation	$100	87	89
Anaconda Copper	50	47⅞	48
Bristol Brass	25	4	7
International Nickel, com	25	38⅝	38⅞
International Nickel, pfd	100	103	..
International Silver, com	100	94	96½
International Silver, pfd	100	102	105½
National Enameling & Stamping	100	27	28
National Enameling & Stamping, pfd	100	82	85
National Lead Company, com	100	159	161
National Lead Company, pfd	100	116	117½
New Jersey Zinc	100	185	187
Rome Brass & Copper	100	132	142
Scovill Manufacturing Company	..	56	58
Yale & Towne Mfg. Company, new	..	70	72

Corrected by J. K. Rice, Jr., Co., 120 Broadway, New York.

ALUMINUM INVESTIGATION

The Federal Trade Commission held hearings in Pittsburgh, Pa., November 8-10, 1926, into the charges of monopolistic practice by the Aluminum Company of America.

It is charged that this company has a monopoly of the aluminum industry, and also through its subsidiary, the Republic Carbon Company, owns one-third of the bauxite deposits in British Guiana. Arthur V. Davis, president of the Aluminum Company testified, stated that his company has no monopoly on water power.

Hearings were also held in Detroit, Mich., some of the largest consumers giving testimony. P. A. Markey, vice-president of the Bohn Aluminum and Brass Corporation in that city, stated that they had paid excessive prices for aluminum when figuring on competitive jobs against the Aluminum Company's subsidiaries. F. H. Diehl, general purchasing agent of the Ford Motor Company stated that his company had stopped using sheet aluminum because of the increased price in 1924.

Representatives of the General Motors Company units testified in favor of the Aluminum Company stating that they had received satisfactory deliveries at prices which they considered fair.

Review of the Wrought Metal Business

Written for The Metal Industry by J. J. WHITEHEAD, President of the Whitehead Metal Products Company of New York, Inc.

DECEMBER 1, 1926.

The industries which have been the largest consumers of metals have continued to operate on a very satisfactory basis. The result has been that manufacturers of rod, sheet, tube and wire have been able to keep their plants going in full with very little, if any, surplus production. There were some tendencies on the part of the purchasing agents to hold back requisitions, waiting for lower prices, and some idea prevails among them that there will be a materially lower level of quotations reached by the end of the year. In spite of this feeling, however, enough business has been placed to keep the brass and copper mills going at full speed, and deliveries have even been slightly delayed.

The manufacturers of refrigerating machines have resumed operations in a modest way, but no very heavy demands have as yet arisen from them, although it is expected that by the first of the year this demand will materialize. A number of new manufacturers of household refrigerators are about to announce their products, and as the season for these machines advances, it is believed that enough tonnage will be placed to swamp practically all of the manufacturers of seamless copper tubes in the country.

It is difficult to find any note of pessimism throughout the industries although there is a degree of uncertainty because of the unexpected weakness that has developed in the ingot copper market. As a result of this uncertainty the mill are confining their purchases to very close hand to mouth operations and it is reported that future commitments are on a very modest scale. As a result of this condition two schools of opinion have developed, the one holding that any slight concessions in the price of ingot copper will result in a mad rush to purchase by those who have none, and that huge tonnages will be demanded for future delivery, with the result that the price will skyrocket very suddenly. The opposite opinion holds that because of the enormous production of ingot copper the producers will have difficulty in holding even to the prices which are now being quoted. Which of these opinions is correct, the future only will tell, but in the meantime the effect of this diversity of opinion has been to keep purchasing on what is practically a day to day basis.

Producers of Monel metal and pure nickel are ending the year with very satisfactory order books, and bright prospects for the new year. Many new developments which have been in experimental stages during the past year or two are coming through in a commercial way, and these items, together with the increased demand from existing consumers are expected to be sufficient to keep the facilities completely engaged as far into the future as can be reasonably predicted. The market in this line is steady as to price, quite in contrast with the fluctuations and prices in other branches of the industry and this fact is of considerable assistance in keeping the business on a steady level of consumption.

Metal Market Review

Written for The Metal Industry by R. J. HOUSTON, of D. Houston & Company, Inc., Metal Brokers, New York

December, 1926.

COPPER

The market for copper lost ground last month, with the domestic quotation closing at 13.70c and showing a loss of about 30 points since November 1st. Meantime sales in this country and Europe were in moderate volume at concessions, even if not on a very heavy scale. Withdrawal of the British Metals Corporation from membership in the new Copper Exporters, Inc., attracted considerable attention in trade circles. This company is a large distributor of copper in the English market and handles an important tonnage of American product and a portion of the output of the Katauga mines.

For the most part, recent news was construed as of a cautionary nature, in so far as it related to market values. Consumers, although apparently watching the situation closely, have been disposed to limit purchases and await the outcome of the consolidation of important interests. The general trend of the market has been easy for several weeks, and statistics show that production is in position to more than keep pace with domestic consumption and world requirements. But surplus stocks of refined copper on November 1 were only 68,233 short tons, against 73,082 tons at beginning of 1926. Shipments for export in October were 51,085 tons compared with 41,452 tons in September. Price of copper is low, factories are operating on an extensive scale, and the outlook for the coming year is promising if output is kept within bounds.

ZINC

The good statistical position of zinc continues in evidence, and although domestic consumption keeps up in heavy volume, the market has ruled dull and easy lately at 7.52½c New York basis and 7.15c@7.17½c St. Louis. Stocks are small but buyers lean to a conservative purchasing policy as the year draws to an end. The October output of all grades amounted to 54,979 tons as against 52,144 tons in September. The amount shipped for domestic account and export in October was 54,769 tons, and the amount in smelters' hands on November 1 was only 15,909, showing the small increase of 210 tons. Market for ore has remained very firm at $47.00, with substantial sales at that price. A revival in foreign demand appears to be needed to give tone to the market and stimulate free buying.

TIN

General activity and sharp price advances marked the course of developments in tin lately. The strength of the market has become a commonplace condition. Fluctuations were frequent and wide. Buying for all positions was on a large scale, and improved sentiment infused remarkable buoyancy into the situation. At the beginning of the month sales of Straits tin for November delivery were made at 66⅝c and a sudden burst of strength shortly after sent the price to 68c for the same position.

Heavy speculative buying continued to be an outstanding feature at London and New York. The prospect of inadequate supplies of Straits tin for balance of the year gave further impetus to the market. Demand for nearby tin increased and on November 23rd the price of Straits tin for prompt delivery advanced to 72½c. The marked increase in price of tin reflects a stringency in supplies whose extent, if it should be further aggravated during the next six months, might eventuate in more acute conditions. While the market is still on a high plane, the close was somewhat quieter at 71½ nominally for spot Straits.

LEAD

The stability of this market is the feature. Underlying conditions have been favorable to a heavy absorption of lead at the present price of 8c New York basis. November sales were heavy at this figure, consumers buying with confidence for future shipment. Inquiries specified deliveries over early 1927, but it is doubtful if all demands were met. Production and consumption is apparently nicely balanced and holders are not anxious to sell too far ahead at current market quotations. The situation is exceptionally interesting, and an upward trend in values would not be surprising in view of the large movement into consumption.

ALUMINUM

A downward price revision was made by the Aluminum Company of America on a number of its aluminum alloys. The reductions amounted to 1 to 1½c per pound on four specifications. The new price for No. 12 virgin grade is 25½c, as against the old price of 26½c. The 99% plus ingots still quote 27c. Consumption continues in large volume of both domestic and imported material. Imports into the United States during the first nine months of this year amounted to 55,371,560 pounds, against 20,997,252 pounds for the first nine months of last year. New uses are opening up for aluminum, and lower prices would mean a greater expansion of consumption.

ANTIMONY

Unsettled conditions in China tend to keep the market irregular and uncertain. Recent business was done at 11¼c c. i. f. New York for future shipment from China. This compares with 12c c.i.f. New York, or 14c duty paid, a short time ago. Large consumers appear to have nearby requirements fairly covered, but there were indications of slightly firmer tone at end of month. Stocks afloat are said to be large.

QUICKSILVER

The position of quicksilver is firm and apparently under strong control. Recent quotations were as high as $100 a flask of 75 pounds. Demand developed on a large scale several weeks ago, leading up to heavy sales. London and New York quotations have reflected the improved position of the article, although there seems to be a slight easing of the market at $98 to $99 per flask.

PLATINUM

Platinum has ruled steady lately at $107 to $110 per ounce for the refined metal. Supplies are closely held. Rumors of increased output are heard, but that does not appear to influence the price.

SILVER

The silver market continues to fluctuate up and down at the low price levels recently established in all the markets of the world. The high point last month was 55¾c, but on December 1 the market was again down to 53¼c. India was a buyer one day and a seller another. China was also in and out of the market in a comparative moderate way. Prompt silver was in fair demand and for a season caused a little stiffening of market trend.

OLD METALS

Business in scrap metals was in substantial volume, with a good foreign demand for brass and copper. Readjustments on a sliding schedule downward were in progress lately, however, owing to further weakness in the copper market. The domestic consuming demand became less active, but prices have receded rather reluctantly in some quarters. The tone is easier for the time being, but with consumption at an encouraging rate and export outlet maintained at recent level, the trade is not inclined to be too pessimistic despite some uncertainties. Present quotations are somewhat irregular. Current prices dealers are willing to pay quote 10¾c@11c for heavy copper scrap, 9c@9¼c for light copper, 6¾c@7c for heavy brass, new brass clippings 9c@9¼c, heavy lead 6¼c@6⅝c, new zinc scrap 5½c@5¾c, and aluminum clippings 21c@21¼c.

WATERBURY AVERAGE

Lake Copper—Average for 1925, 14,427—January, 1926 14.25c.—February, 14⅜c.—March, 14.25c.—April, 14.125c.—May, 14.00c.—June, 14.00c.—July, 14.25c.—August, 14.50c.—September, 14.50c.—October, 14.25c.—November, 14.00c.

Brass Mill Zinc—Average for 1925, 8.263—January, 1926, 9.00c.—February, 8.20c.—March, 7.80c.—April, 7.45c.—May, 7.20c.—June, 7.55c.—July, 7.80c.—August, 7.80c.—September, 7.85c.—October, 7.70c.—November, 7.60c.

Daily Metal Prices for the Month of November, 1926

Record of Daily, Highest, Lowest and Average Prices and the Customs Duties

	1	*2	3	4	5	8	9	10	11	12	15	16	17
Copper (f. o. b. Ref.) c/lb. Duty Free													
Lake (Delivered)	14.125	.....	14.125	14.125	14.125	14.125	14.00	14.00	14.00	14.00	14.00	14.00	14.00
Electrolytic	14.00	.....	14.025	14.00	13.95	13.95	13.95	13.95	13.80	13.80	13.80	13.80	13.80
Casting	13.65	.....	13.65	13.60	13.55	13.55	13.50	13.50	13.50	13.50	13.50	13.50	13.50
Zinc (f. o. b. St. L.) c/lb. Duty 1¼c/lb.													
Prime Western	7.275	.....	7.275	7.225	7.175	7.175	7.225	7.225	7.225	7.25	7.275	7.275	7.275
Brass Special	7.30	.....	7.30	7.25	7.225	7.225	7.275	7.275	7.275	7.30	7.325	7.325	7.325
Tin (f. o. b., N. Y.) c/lb. Duty Free													
Straits	68.00	.....	69.50	69.00	69.00	70.00	71.00	70.50	70.25	70.25	70.50	71.00	71.50
Fig 99%	.....	.....	66.75	66.50	.....	68.00	.....	.....	.....	.....	68.75	69.25	69.50
Lead (f. o. b. St. L.) c/lb. Duty 2½c/lb.	7.90	.....	7.85	7.80	7.75	7.80	7.80	7.80	7.80	7.80	7.80	7.85	7.85
Aluminum c/lb. Duty 5c/lb.	27	.....	27	27	27	27	27	27	27	27	27	27	27
Nickel c/lb. Duty 3c/lb.													
Ingot	35	.....	35	35	35	35	35	35	35	35	35	35	35
Shot	36	.....	36	36	36	36	36	36	36	36	36	36	36
Electrolytic	39	.....	39	39	39	39	39	39	39	39	39	39	39
Antimony (J. & Ch.) c/lb. Duty 2c/lb.	13.00	.....	12.75	12.75	12.75	13.00	13.50	13.50	13.25	13.25	13.00	12.875	13.00
Silver c/oz. Troy Duty Free	53.375	.....	52.75	53.00	52.875	53.50	53.375	53.375	54.375	54.75	54.50	55.375	55.50
Platinum $/oz. Troy Duty Free	110	.....	110	110	110	110	110	110	110	110	110	110	110

	18	19	22	23	24	*25	26	29	30	High	Low	Aver.
Copper (f. o. b. Ref.) c/lb. Duty Free												
Lake (Delivered)	14.00	14.00	14.00	13.875	13.875	.....	13.875	13.875	13.75	14.125	13.75	13.994
Electrolytic	13.80	13.80	13.625	13.625	13.625	.....	13.55	13.55	13.50	14.025	13.50	13.795
Casting	13.50	13.45	13.40	13.375	13.375	.....	13.30	13.30	13.25	13.65	13.25	13.473
Zinc (f. o. b. St. L.) c/lb. Duty 1¼c/lb.												
Prime Western	7.25	7.225	7.20	7.20	7.20	.....	7.175	7.175	7.15	7.275	7.15	7.223
Brass Special	7.30	7.275	7.25	7.25	7.25	.....	7.25	7.25	7.225	7.325	7.225	7.273
Tin (f. o. b., N. Y.) c/lb. Duty Free												
Straits	71.00	70.75	71.75	72.50	71.50	.....	71.75	72.25	71.50	72.25	68.00	70.675
Fig 99%	69.25	69.00	69.625	70.25	69.25	.....	69.75	70.25	69.50	70.25	66.50	68.973
Lead (f. o. b. St. L.) c/lb. Duty 2½c/lb.	7.90	7.85	7.85	7.85	7.85	.....	7.80	7.80	7.80	7.90	7.75	7.825
Aluminum c/lb. Duty 5c/lb.	27	27	27	27	27	.....	27	27	27	27	27	27
Nickel c/lb. Duty 3c/lb.												
Ingot	35	35	35	35	35	.....	35	35	35	35	35	35
Shot	36	36	36	36	36	.....	36	36	36	36	36	36
Electrolytic	39	39	39	39	39	.....	39	39	39	39	39	39
Antimony (J. & Ch.) c/lb. Duty 2c/lb.	13.00	13.25	14.00	14.00	13.875	.....	13.875	13.875	13.50	14.00	12.75	13.30
Silver c/oz. Troy Duty Free	55.75	54.375	54.625	54.50	54.00	.....	54.50	54.375	54.125	55.50	52.75	54.15
Platinum $/oz. Troy Duty Free	110	110	110	110	110	.....	110	110	110	110	110	110

*Holiday.

Metal Prices, December 6, 1926

NEW METALS

Copper: Lake, 13.75. Electrolytic, 13.45. Casting, 13.125.
Zinc: Prime Western, 7.05. Brass Special, 7.10.
Tin: Straits, 70.75. Pig, 99%, 68.50.
Lead: 7.80. **Aluminum**, 27.00. **Antimony**, 13.875.
Nickel: Ingot, 35. Shot, 36. Elec., 39. Pellets, 40.
Quicksilver: flask, 75 lbs., $100.00. **Bismuth**, $2.70 to $2.75.
Cadmium, 60. **Cobalt**, 97%, $2.60. **Silver**, oz., Troy, 53.125.
Gold, oz., Troy, $20.67. **Platinum**, oz., Troy, $110.00.

INGOT METALS AND ALLOYS

Brass Ingots, Yellow	10½to11½
Brass Ingots, Red	12 to13
Bronze Ingots	12 to13
Casting Aluminum Alloys	21 to24
Manganese Bronze Castings	23 to40
Manganese Bronze Ingots	13 to16½
Manganese Bronze Forging	32 to40
Manganese Copper, 30%	25 to35
Monel Metal Shot	32
Monel Metal Blocks	32
Parsons Manganese Bronze Ingots	18¼to19¾
Phosphor Bronze	13½to15
Phosphor Copper, guaranteed 15%	18⅞to22½
Phosphor Copper, guaranteed 10%	18 to21½
Phosphor Tin, guaranteed 5%	70 to80
Phosphor Tin, no guarantee	70 to80
Silicon Copper, 10%....according to quantity...	30 to36

OLD METALS

Buying Prices		Selling Prices
11¼to11¾	Heavy Cut Copper	12¾to13¼
11 to11½	Copper Wire	12½to12¾
9½to10	Light Copper	11 to11¼
8¾to 9	Heavy Machine Composition	10¼to10½
7½to 7¾	Heavy Brass	9 to 9¼
6½to 6¾	Light Brass	7¾to 8
7½to 8	No. 1 Yellow Brass Turnings	9¼to 9¾
8½to 9	No. 1 Composition Turnings	10¼to10¾
6½to 6¾	Heavy Lead	7½to 7¾
4½to 4¾	Zinc Scrap	5½to 6
11 to12	Scrap Aluminum Turnings	14 to16
15½to16	Scrap Aluminum, cast alloyed	19 to20
22 to22½	Scrap Aluminum, sheet (new)	24½to25
38 to40	No. 1 Pewter	42 to44
12	Old Nickel Anodes	14
18	Old Nickel	20

Wrought Metals and Alloys

COPPER SHEET

Mill shipments (hot rolled)	21¼c. to 22¼c. net base
From stock	22¼c. to 23¼c. net base

BARE COPPER WIRE

16c. to 16⅛c. net base, in carload lots.

COPPER SEAMLESS TUBING

24¼c. to 25¼c. net base.

SOLDERING COPPERS

300 lbs. and over in one order	20¾c. net base
100 lbs. to 200 lbs. in one order	21¼c. net base

ZINC SHEET

Duty, sheet, 15% — Cents per lb.
Carload lots, standard sizes and gauges, at mill, less
8 per cent discount ..... 11.75 net base
Casks, jobbers' price ..... 13.00 net base
Open Casks, jobbers' price ..... 13.50 to 13.75 net base

ALUMINUM SHEET AND COIL

Aluminum sheet, 18 ga., base price	39c.
Aluminum coils, 24 ga., base price	35.7c.
Foreign	40c.

ROLLED NICKEL SHEET AND ROD

Net Base Prices

Cold Drawn Rods	53c.	Cold Rolled Sheet	60c.
Hot Rolled Rods	45c.	Hot Rolled Sheet	52c.

BLOCK TIN SHEET

Block Tin Sheet—18" wide or less. No. 26 B. & S. Gauge or thicker, 100 lbs. or more, 10c or over Pig Tin; 50 to 100 lbs., 15c. over; 25 to 50 lbs., 17c. over; less than 25 lbs., 25c. over.

SILVER SHEET

Rolled sterling silver 56 to 58c.

BRASS MATERIAL—MILL SHIPMENTS

In effect November 23, 1926
To customers who buy 5,000 lbs. or more in one order.

	Net base per lb. High Brass	Low Brass	Bronze
Sheet	$0.18⅝	$0.20⅛	$0.22⅛
Wire	.19⅛	.20⅝	.22⅝
Rod	.16⅛	.20⅞	.22⅞
Brazed tubing	.26⅝	.....	.31⅞
Open seam tubing	.26⅝	.....	.31⅞
Angles and channels	.29⅝	.....	.34⅞

For less than 5,000 lbs. add 1c. per lb. to above prices.

BRASS SEAMLESS TUBING

23½c. to 24½c. net base.

TOBIN BRONZE AND MUNTZ METAL

Tobin Bronze Rod	20⅝c. net base
Muntz or Yellow Metal Sheathing (14"x48")	18⅝c. net base
Muntz or Yellow Rectangular sheet other Sheathing	19⅝c. net base
Muntz or Yellow Metal Rod	16⅝c. net base

Above are for 100 lbs. or more in one order.

NICKEL SILVER (NICKELENE)

Net Base Prices

Grade "A" Sheet Metal		Wire and Rod	
10% Quality	26½c.	10% Quality	29½c.
15% "	28 c.	15% "	33¼c.
18% "	29¼c.	18% "	36½c.

MONEL METAL SHEET AND ROD

Hot Rolled Rods (base)	35	Hot Rolled Sheets (base)	42
Cold Drawn Rods (base)	43	Cold Rolled Sheets (base)	50

BRITANNIA METAL SHEET

No. 1 Britannia—18" wide or less, No. 26 B. & S. Gauge or thicker, 500 lbs. or over, 8c. over N. Y. tin price; 100 lbs. to 500 lbs., 10c. over; 50 to 100 lbs., 15c. over; 25 to 50 lbs., 20c. over; less than 25 lbs., 25c. over. Prices f. o. b. mill.

Supply Prices, December 6, 1926

ANODES

Copper: Cast	21 c. per lb.	**Nickel:** 90-92%	45c. per lb.
Rolled	21⅛c. per lb.	95-97%	47c. per lb.
Electrolytic	18⅜c. per lb.	99%	49c. per lb.
Brass: Cast	20 c. per lb.	**Silver:** Rolled silver anodes .999 fine are quoted from 57¾c. to 59¾c. per Troy ounce, depending upon quantity purchased.	
Rolled	20⅞c. per lb.		
Zinc: Cast	14¼c. per lb.		

FELT POLISHING WHEELS WHITE SPANISH

Diameter	Thickness	Under 100 lbs.	100 to 200 lbs.	Over 200 lbs.
10-12-14 & 16"	1" to 3"	$3.00/lb.	$2.75/lb.	$2.65/lb.
6-8 & over 16	1 to 3	3.10	2.85	2.75
6 to 24	Under ½	4.25	4.00	3.90
6 to 24	½ to 1	4.00	3.75	3.65
6 to 24	Over 3	3.40	3.15	3.05
4 up to 6	¼ to 3	4.85	4.85	4.85
4 up to 6	Over 3	5.25	5.25	5.25
Under 4	¼ to 3	5.45	5.45	5.45
Under 4	Over 3	5.85	5.85	5.85

Grey Mexican Wheel deduct 10c per lb. from White Spanish prices.

COTTON BUFFS

Full Disc Open buffs, per 100 sections.

12" 20 ply 64/68 Unbleached	$27.65–28.85
14" 20 ply 64/68 Unbleached	35.55–35.90
12" 20 ply 80/92 Unbleached	30.10
14" 20 ply 80/92 Unbleached	40.80
12" 20 ply 84/92 Unbleached	33.05–39.30
14" 20 ply 84/92 Unbleached	44.80–52.60
12" 20 ply 80/84 Unbleached	34.25–35.25
14" 20 ply 80/84 Unbleached	46.40–47.50

Sewed Pieced Buffs, per lb., bleached 65-75c.

CHEMICALS

These are manufacturers' quantity prices and based on delivery from New York City.

Acetone	lb.	.12–.16
Acid—Boric (Boracic) Crystals	lb.	.12
Hydrochloric (Muriatic) Tech., 20°, Carboys	lb.	.02
Hydrochloric, C. P., 20 deg., carboys	lb.	.06
Hydrofluoric, 30%, bbls	lb.	.08
Nitric, 36 deg., carboys	lb.	.06
Nitric, 42 deg., carboys	lb.	.07
Sulphuric, 66 deg., carboys	lb.	.02
Alcohol—Butyl	lb.	.18¾–.23¼
Denatured, bbls.	gal.	.46
Alum—Lump, Barrels	lb.	.03¼
Powdered, Barrels	lb.	.042
Aluminum sulphate, commercial tech	lb.	.02⅜
Aluminum chloride solution in carboys	lb.	.06½
Ammonium—Sulphate, tech. bbls	lb.	.03¾
Sulphocyanide	lb.	.65
Arsenic, white, kegs	lb.	.05
Asphaltum	lb.	.35
Benzol, pure	gal.	.60
Borax Crystals (Sodium Biborate), bbls	lb.	.05½
Calcium Carbonate (Precipitated Chalk)	lb.	.04
Carbon Bisulphide, Drums	lb.	.06
Chrome Green, bbls	lb.	.29
Copper—Acetate (Verdegris)	lb.	.37
Carbonate, bbls	lb.	.17
Cyanide (100 lb. kegs)	lb.	.50
Sulphate, bbls.	lb.	.05½
Cream of Tartar Crystals (Potassium bitartrate)	lb.	.27
Crocus	lb.	.15
Dextrin	lb.	.05–.08
Emery Flour	lb.	.06
Flint, powdered	ton	$30.00
Fluor-spar (Calcic fluoride)	ton	$75.00
Fusel Oil	gal.	$4.45
Gold Chloride	oz.	$14.00
Gum—Sandarac	lb.	.26
Shellac	lb.	.59–.61
Iron, Sulphate (Copperas), bbl	lb.	.01½
Lead Acetate (Sugar of Lead)	lb.	.13¾
Yellow Oxide (Litharge)	lb.	.12½
Mercury Bichloride (Corrosive Sublimate)	lb.	$1.21
Nickel—Carbonate dry, bbls	lb.	.29
Chloride, bbls.	lb.	.17–.18
Salts, single 300 lb. bbls	lb.	.10½
Salts, double 425 lb. bbls	lb.	.10
Paraffin	lb.	.05–.06
Phosphorus—Duty free, according to quantity		.35–.40
Potash, Caustic Electrolytic 88-92% broken, drums	lb.	.09¼
Potassium Bichromate, casks (crystals)	lb.	.08½
Carbonate, 96-98%	lb.	.07
Cyanide, 165 lb. cases, 94-96%	lb.	.57½
Pumice, ground, bbls	lb.	.02½
Quartz, powdered	ton	$30.00
Rosin, bbls.	lb.	.04½
Rouge, nickel, 100 lb. lots	lb.	.25
Silver and Gold	lb	.65
Sal Ammoniac (Ammonium Chloride) in casks	lb.	.06
Silver Chloride, dry	oz.	.86
Cyanide (fluctuating)	oz.	.55
Nitrate, 100 ounce lots	oz.	.38¾
Soda Ash, 58%, bbls	lb.	.02½
Sodium—Cyanide, 96 to 98%, 100 lbs	lb.	.20
Hyposulphite, kegs	lb.	.04
Nitrate, tech., bbls	lb.	.04¾
Phosphate, tech., bbls	lb.	.03¾
Silicate (Water Glass), bbls	lb.	.02
Sulpho Cyanide	lb.	.45
Sulphur (Brimstone), bbls	lb.	.02
Tin Chloride, 100 lb. kegs	lb.	.50
Tripoli, Powdered	lb.	.03
Wax—Bees, white ref. bleached	lb.	.60
Yellow, No. 1	lb.	.45
Whiting, Bolted	lb.	.02½–.06
Zinc, Carbonate, bbls	lb.	.11–.12
Chloride, casks	lb.	.06¾
Cyanide (100 lb. kegs)	lb.	.41
Sulphate, bbls.	lb.	.03½

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INDEX NUMBER

Vol. 24. No. 12 DECEMBER, 1926

THE METAL INDUSTRY

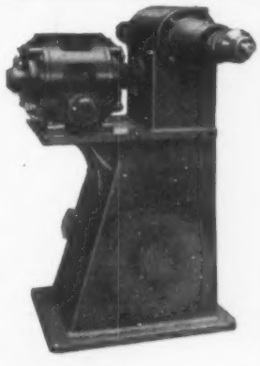
WITH WHICH ARE INCORPORATED
THE ALUMINUM WORLD: COPPER AND BRASS: THE BRASS FOUNDER AND FINISHER
ELECTRO-PLATERS REVIEW

Entered as second class matter February 10, 1903, at the post office in New York under the Act of 1879.

A MONTHLY PUBLICATION RELATING TO THE METAL AND PLATING TRADES

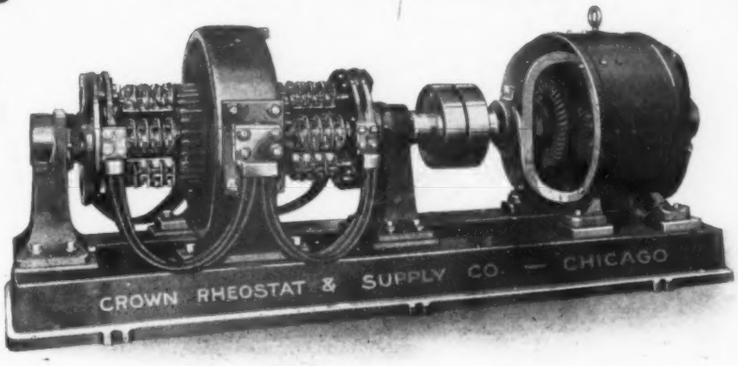
SUBSCRIPTION PRICE PER YEAR, UNITED STATES AND CANADA, ONE DOLLAR; OTHER COUNTRIES TWO DOLLARS. THE METAL INDUSTRY PUBLISHING COMPANY, 99 JOHN ST., NEW YORK, U. S. A.

CROWN RHEOSTAT AND SUPPLY CO. — THE HOUSE OF QUALITY — ESTABLISHED 1914



Repeat orders are the proof of the
Efficiency and Durability of
CROWN PRODUCTS

CROWN BELTED LATHES



CROWN ELECTRIC LATHES

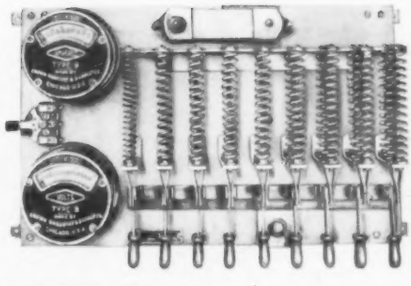
MAXIMUS GENERATORS

CROWN PLATING BARREL

Electric or belt-driven are the latest and sturdiest of an old standby

CROWN RHEOSTATS
(Patented)

18,000 in use. Manufactured only by



CROWN RHEOSTAT & SUPPLY CO.
1910 MAYPOLE AVE. CHICAGO, ILL.

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Finished with Egyptian Lacquer

WHETHER you require a lacquer for objects of art, lighting fixtures or iron castings, there is an Egyptian Lacquer that will meet the requirement.

For over forty years Egyptian Lacquers have been known and used by a diversified line of industry and today Egyptian Lacquer Products are the acknowledged standard of comparison by hundreds of lacquer users.

The Egyptian Lacquer Mfg. Co.

90 West Street, New York

WE CALL YOUR

SPECIAL ATTENTION

to our MONARCH hand built all sheet steel, heavily insulated CORE OVENS of either the ACME overhead trolley type, or Arundel drop front or our single and double door OVENS with or without Trucks.

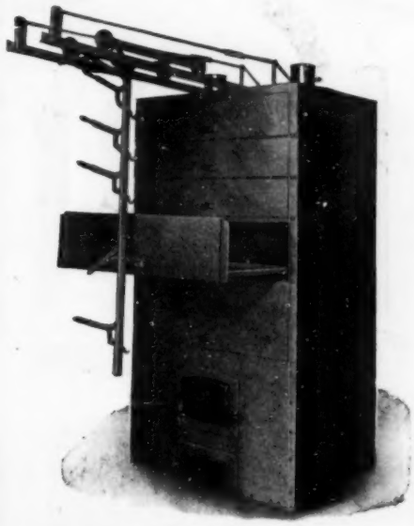
All OVENS are hand built, day labor, and guaranteed in all respects.

KINDLY ADVISE US OF YOUR REQUIREMENTS

For the year 1927 we solicit of you inquiries and orders for MONARCH COMPLETE LINE OF FOUNDRY MELTING FURNACES, OVENS, and likewise.

We anticipate a good business beginning early part of the coming year relating to equipment.

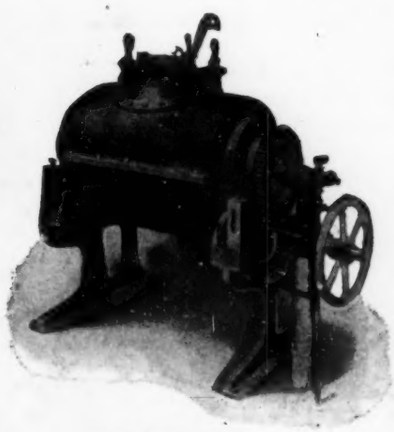
Stationary Crucible



MONARCH "ACME"
"Coke—Coal"

Monarch "ARUNDEL" Drop Front Gas

Tilting Crucible



SIMPLEX FIG. No. 92
Capacities from 500 to 24,000 lbs. per heat. Ask for detailed catalogue, Nos. 91 to 98—Air from 8 to 16 oz. from blower. References furnished.

WRITE US FOR CATALOGUE T. M. I. 12-1926.

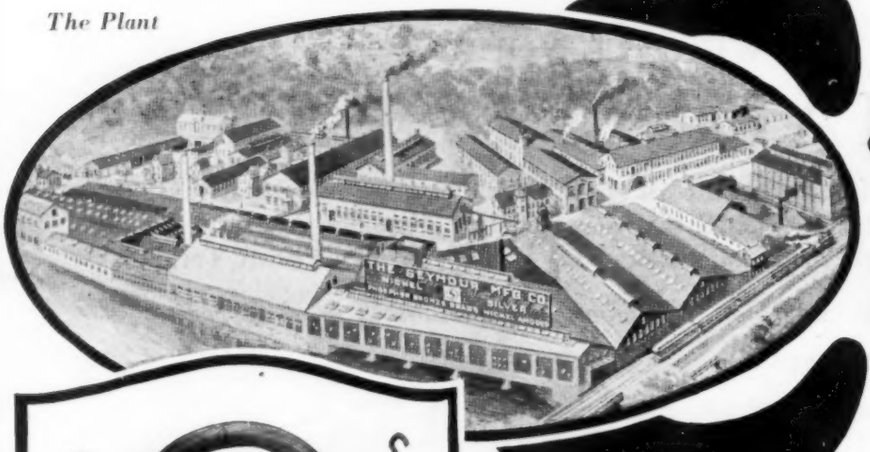
Manufactured by

THE MONARCH ENGINEERING & MFG. CO.

1206 AMERICAN BLDG. :: BALTIMORE, MD.

Works: Curtis Bay, Md.

The Plant



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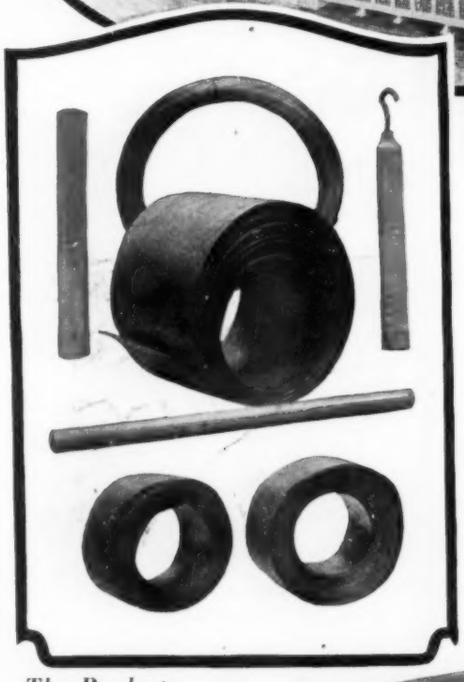


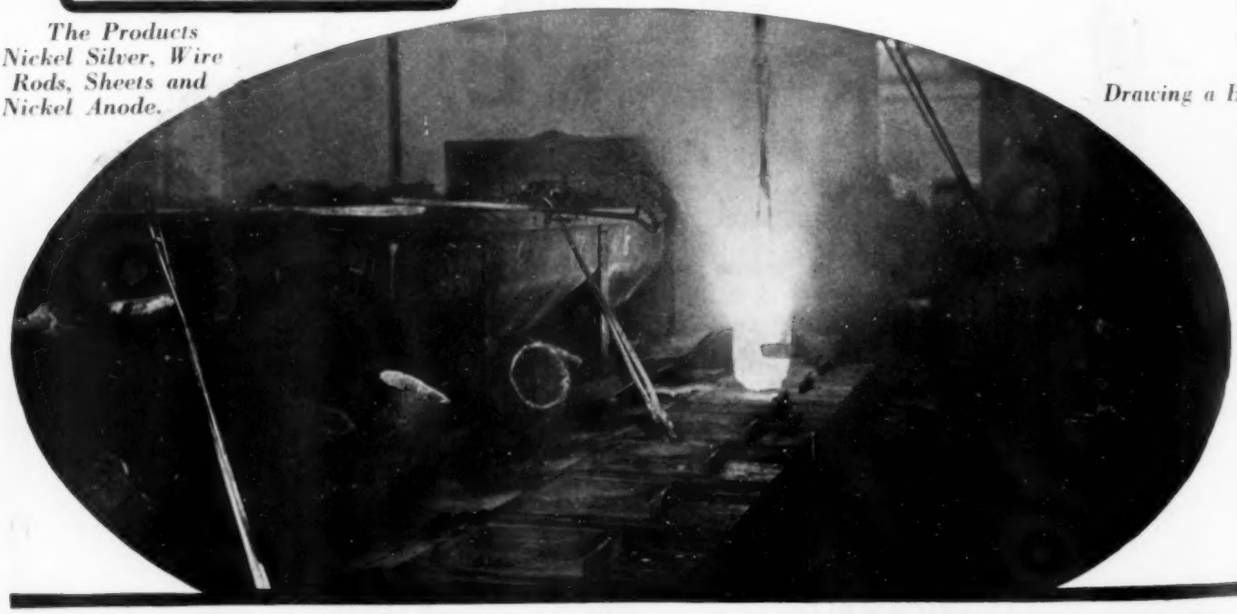
The Products Nickel Silver, Wire Rods, Sheets and Nickel Anode.

FOR almost a half century, The Seymour Manufacturing Co. has been noted for the uniformly high quality of its Nickel Silver.

From the casting of the bar, to the final finishing operation, the most painstaking care has been necessary to maintain such a position in the industry.

During this half century, The Seymour Manufacturing Co. has depended upon crucibles for the all important first step of melting.

Drawing a Heat



AGE ADAPTABILITY

cibles

NICKEL SILVER presents one of the most difficult problems, from the standpoint of melting, of any of the non-ferrous alloys.

Requiring as it does, temperatures exceeding 2250 degrees Fahrenheit, and being sensitive to oxidation and slag inclusions, the container in which it is melted becomes all important.

The service is so severe that only the high standards maintained by producers of crucibles, both as to materials and methods of manufacture, make it possible to handle the melting of this important alloy without prohibitive expense.

The illustrations on these pages show Nickel Silver being cast at the plant of The Seymour Manufacturing Co.—users of crucibles in the severest service for almost fifty years, millions of pounds being cast annually.

Vesuvius Crucible Company, Swissvale, Pa.
Ross-Tacony Crucible Company, Tacony, Phila., Pa.
Jonathan Bartley Crucible Company, Trenton, N. J.
Chicago Crucible Company, Chicago, Ill.
Joseph Dixon Crucible Company, Jersey City, N. J.
Lava Crucible Company of Pittsburgh, Pittsburgh, Pa.
Naugatuck Valley Crucible Company, Shelton, Conn.

Pouring Ingots

RELIABILITY ECONOMY

You Can Easily Produce Metal of Quality and Stability

In the days when Brass and Bronze, specked with honeycomb and gas holes, proved a commercial failure, it was a self gone conclusion that the mold was not properly vented or from some such trifling cause the casting came to be a loss. Today we rather look upon the oxides held in suspense in the metal as mischief makers. Clear out the oxides and other deteriorated particles of metal with the use of Boronic Copper Alloys (in shot form) and you at once transform the metal in the crucible or furnace into a free flowing fluid which passes very readily into every nook-and-crook of the mold bringing as a result a finely finished surface to the casting and in addition a metal that is homogeneous, structurally sound, strong and easily machined; a metal which has all the desirable qualities of high grade general purpose brass or bronze in its original goodness. In fact many tests made of tensile strength carry unusual indications of soundness and quality as compared with untreated metals.

FOR ALLOYING, DEOXIDIZING AND SOLID-CASTING ALL METALS
ALL METAL BORONIC PRODUCTS IN SHOT FORM
MADE IN AMERICA FOR ALL THE WORLD

These tests are illuminating to the average foundryman and are liberally illustrated in the

"STORY OF BORONICS"

a copy of which we shall be pleased to send to any reader of this paper.

Address—

American Boron Products Co., Inc.

Ramsdell and Elmwood Aves.

BUFFALO, N. Y.

Fill in the Coupon—do it today.

To the Metal Manufacturer or Individual Mixer of Metals:

PLEASE USE THIS COUPON

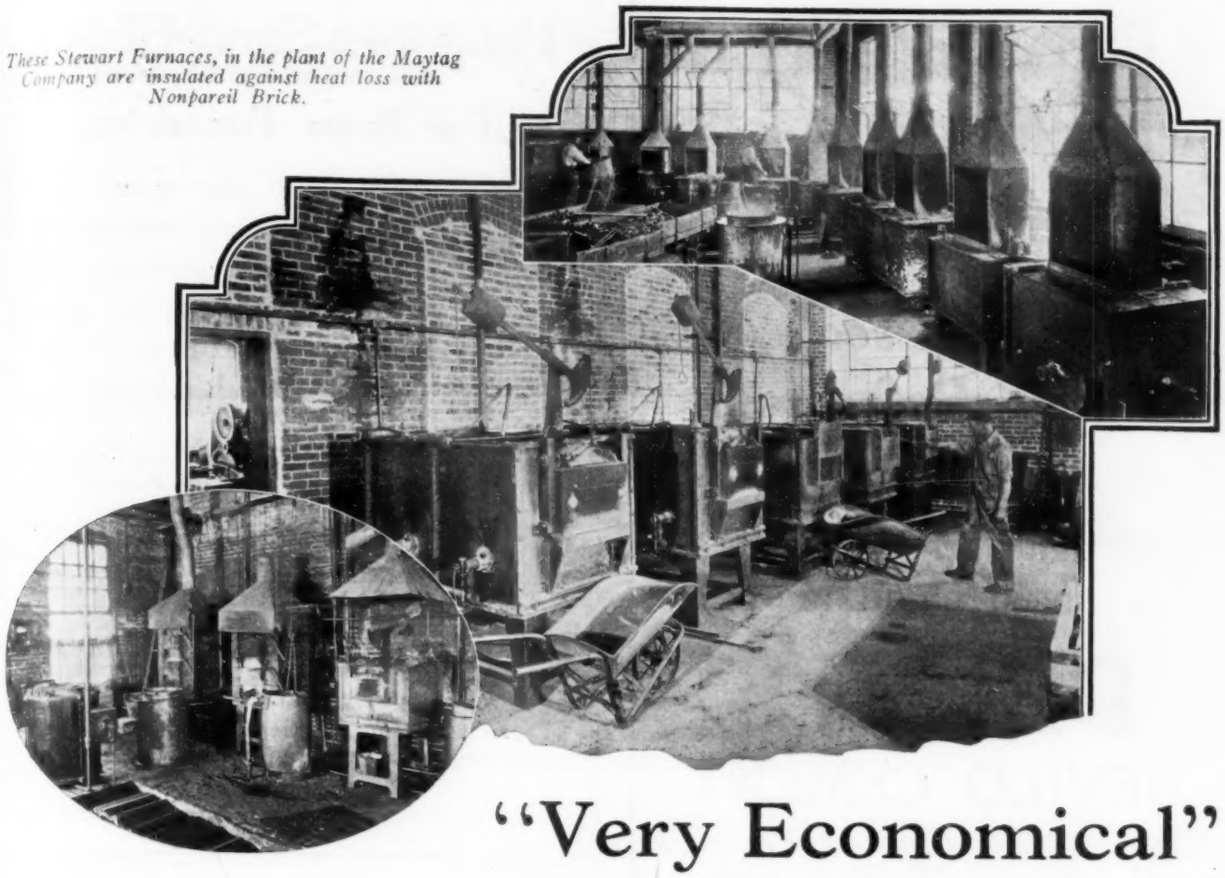
American Boron Products Co., Inc.,
Ramsdell & Elmwood Ave., Buffalo, N. Y.

Gentlemen:—Kindly send me complete details regarding the many ways whereby I can economize by using Boronic Alloying Metals.

My Home Address Is:

Name .....Street .....

City .....State .....



These Stewart Furnaces, in the plant of the Maytag Company are insulated against heat loss with Nonpareil Brick.

"Very Economical"

FURNACES that are adequately insulated against radiation loss with Nonpareil Insulating Brick show consistently low operating costs, for with this heat waste largely eliminated, considerably less fuel is required.

That's why the Stewart furnaces, illustrated above, are insulated with a layer of Nonpareil Brick inside the casing, and that's why their users, the Maytag Company, Newton, Iowa, manufacturers of Maytag Washing Machines, write:

"We have found Stewart Furnaces to be very economical, which is an important item in our operating costs."

A 4½-inch thickness of Nonpareil Brick will save 60% to 75% of the heat ordinarily lost by radiation from uninsulated furnaces—savings that often amount to as much as 25% of the fuel consumed. And in addition, heat-tight construction results in more uniform working temperatures, quicker heating and more comfortable working conditions around the equipment, all of which increase productive capacity.

Nonpareil Insulating Brick are adaptable for use in furnaces, ovens, boiler settings, producer gas mains, blast furnace stoves, etc. Detailed information on their use is contained in the book, "Nonpareil Insulating Brick," a copy of which will be mailed on request.

ARMSTRONG CORK & INSULATION COMPANY
Division of Armstrong Cork Company
116 Twenty-fourth Street Pittsburgh, Pa.

Nonpareil Insulating Brick

For Furnaces and Ovens

Are you in search of A Real Refractory Refractory?

So far such has only been found in

DIXON'S
DEVILO CEMENT

It costs a bit more but what, please, is first cost when compared with final results? You cannot afford not to use

DIXON'S DEVILO CEMENT

Packed in 600 lb. Bbls. 10c. Per lb.
½ Bbls. 11c. " lb.
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JOSEPH DIXON CRUCIBLE CO.
Jersey City, N. J.

Pangborn Sand-Blasts
and Dust Suppression Equipment

For Brass Foundries

Type "GF" Barrel

fit your space, your product, tonnage and your pocketbook. Whether you need a Cabinet, Table, Barrel, or Room.

One concern saved the price of Equipment in six months on a daily melt of 1,700 lbs.

Ask for a catalog, if only to file for use when you want it.

Pangborn Corporation
Sand-Blast and Dust Suppression Equipment, Hagerstown, Md.

There is a Room, Table, Cabinet, or Barrel in the Pangborn line that just meets *your* needs.

Metal Recovery
in a
Hardinge Cinder Crusher

Feed your cinders and waste product to a Hardinge Conical Mill and reclaim the metal you are losing.

Brass foundry cinders, Machine shop scrap, Battery waste, Slags, Dross all are being ground today in Hardinge Mills for the recovery of valuable metal.

Catalogue No. 8 gives full details.

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YORK, PENNSYLVANIA
WORKS AND MAIN OFFICE YORK, PENNA.
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SALT LAKE CITY UTAH: CONTINENTAL BANK BLDG.
CABLE ADDRESS: HARDINGECHIEF NEW YORK

OUR RESPONSIBILITY STARTS
WITH YOUR FIRST

PURCHASE

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We must give you a good crucible if we expect the second purchase order to come through.

We have been in business for many years and have grown largely on repeat business.

This is how we make headway—
First—We use the best materials.
Second—We make "Special Requirements" Crucibles.
Third—Our crucibles are made by the Lawton Process.
Fourth—We give service backed by years of experience.

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LAWTON PROCESS VICTORY B-42 CRUCIBLES

45 "SEQUENCE CALLS" $82,500 WORTH OF BONDS

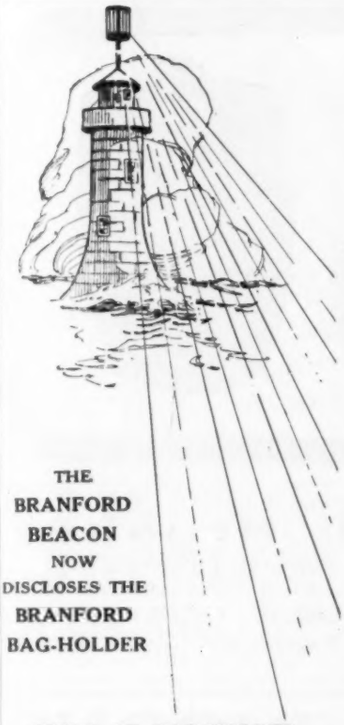
IN BRINGING out a new bond issue, a Cleveland financial house regularly files with the long distance operators from 50 to 100 sequence calls to banks and investment firms in other cities. The calls come in in one-two-three order. As one is finished another is put up, so that a greater number of calls can be completed within a given time. For one such issue, 47 calls were filed . . . 45 were completed. Charges, $40 . . . sales, $82,500.

"SEQUENCE lists" are another convenience worked out to increase the effectiveness of long distance campaigns and to save the time of the telephone user. Many who formerly used the telephone only locally are now using it to distant states and towns. Many who used only single calls are now taking advantage of the sequence method. Concerns that at first used long distance calls only when an emergency arose, now depend on them to make appointments, to save long and tiresome trips, to make sales where interviews have been denied, and to make purchases where both time and price are important.

Would it be worth while to make a thorough check-up of your various departments and executives to see if the telephone is bringing its full resources to bear upon your business? Each working day sees another million dollars invested in the communication equipment of the Bell System. Does your business secure its share of the added advantages of these developments? The telephone resources of any business are worthy of careful study. Firms are frequently amazed to discover their unthought-of possibilities.

A Commercial Department representative will gladly call to explain the use of sequence lists and consult with you concerning what long distance calls can do for your business. And now, what distant call is there that should be made? Seventy thousand communities are within your easy reach. . . . . *Number, please?*

BELL LONG DISTANCE SERVICE



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PRICE OF BAG-HOLDER
$10.00
F. O. B. BRANFORD, CT.

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THE NEW BRANFORD BAG-HOLDER

WILL CUT COST IN SHIPPING THE ABOVE

This bag holder pays for itself in one week by the elimination of the helper in the shipping room.

Will take from 20″ to 30″ bags by simply reversing bottom for top.

Bag is held up by three pegs which are screwed into frame.

Made of semi-steel and steel tubing and height can be varied to suit customer's needs. Regular height 30″.

Especially designed for Shipping Light Brass and Iron Castings in Bags.

Malleable Iron Fittings Co.

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Say, Fellas, I'm In Florida Now!

A LAVALIER by LAVA LUKE

I got a real stand-in with the boss. Last week he says, "Luke, you're a hard worker and have alwuz wanted to see Florida. Take a month off with pay an' go—an' have a real vacatshun." It's great down here, but I can't help thinkin' about you guys.

You foundrymen hev a tough job with yer perduction problems and specifications to meet an keen competition addin' to yer worries but not to yer profits. Boys, Ole Lava Luke revels in thu glory uv bein' able to make yer burdens lighter with good ole Lava Pots and Refractories.

It's thu foundryman who makes his margin uv profit greater by shavin' costs wot will know wot I mean.

LAVA LUKE.

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Lava Crucible Co. of Pittsburgh
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DIE-CASTING MACHINES—$50.00
For—ZINC, TIN, LEAD ALLOYS
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COAL—OIL - GAS ELECTRICITY
Let Us Handle Your Heating Problems
"FURNACE AND FUEL TO SUIT CONDITIONS"

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For Phosphor-Bronze Copper, Tin, Etc.
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JOHNSON'S SOLDERING FLUID
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can be used on all metals and their alloys Except Aluminum
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Magnetic Separators of proven ability
The name "HIGH DUTY" is your protection against inferiority.
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UNIFORM TEMPERATURE-MAXIMUM OUTPUT-MINIMUM FUEL COST
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Branches in all principal cities
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BETTER AND CHEAPER THAN SULPHURIC ACID FOR PICKLING.
Comes in dry lumps.
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Tilting Furnace Crucible

Foundries using Rockwell, Ideal, Hausfeld, Case "M. R. V.," Monarch, or other tilting furnaces will find Dixon's Tilting Furnace Crucibles and Bases for same dependable and economical.

The name DIXON on **any** crucible gives assurance that it is **the standard** and is backed by nearly a century of experience in crucible manufacture.

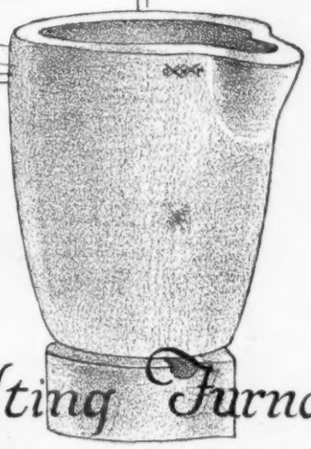
Write for Bulletin 12-A in which are illustrated the full line of Dixon Graphite Crucibles, their sizes and capacities.

JOSEPH DIXON CRUCIBLE CO.

Jersey City, N. J., U. S. A.

Established 1827

DIXON GRAPHITE CRUCIBLES



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HYTEMPITE

Rammed in Linings mean Greater Economy In Construction and Operation

for all types of non-ferrous melting furnaces. No need for special, carefully fitted shapes. Use a mixture of Ganisand or crushed old fire brick and Hytempite and ram it into place between furnace shell and collapsible form of wood or metal. Patch furnaces with plastic mixtures of same materials.

Full directions in new Folder G.M.-116

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Stock and Service in Every Industrial Center

For Quicker Cleaning

From Finest Satin Finish to Deep Frost

Use

NEW HAVEN SANDBLAST

Cabinets and Barrels

Automatic and Self Contained

New Haven Sandblast Company

New Haven, Conn.

HAUSFELD TILTING CRUCIBLE FURNACE

COMPLETE UNIT—GAS OR OIL FUEL

For No. 125 - 150 - 225 and No. 275 Crucible

Complete unit comprises all necessary equipment for feeding both gas and oil fuel. Furnished for gas fuel only if desired.

Manufactured Only by

THE CAMPBELL-HAUSFELD CO.

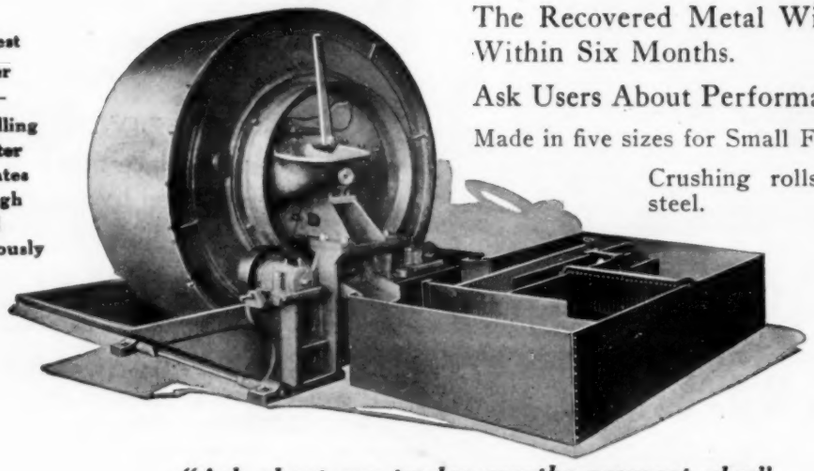
HARRISON, OHIO

Reclaim All Metal From Your Foundry and Casting Shop
Cinders—Ashes—Skimmings and Old Crucibles with the

Standard Metal Reclaiming Mill

Lowest Power

One Filling of Water Circulates Through Mill Continuously



The Recovered Metal Will Pay for Mill Within Six Months.

Ask Users About Performance and Results.

Made in five sizes for Small Foundry to Smelter.

Crushing rolls 12% manganese steel.

The Present Mill Is the Result of Improved Development During Twelve Years of Continuous Service.

"Ask about our twelve months payment plan"

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SINGLE SPINDLE

Cock Grinder

adapted for all classes of ground key work up to 2" and for use in the small shop making one to two hundred cocks a day. Also useful and economical in the big shop for grinding small lots of special cocks.

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For Quicker Melts

Without the Use of Forced AIR BLAST

Are more economical and less trouble to operate.

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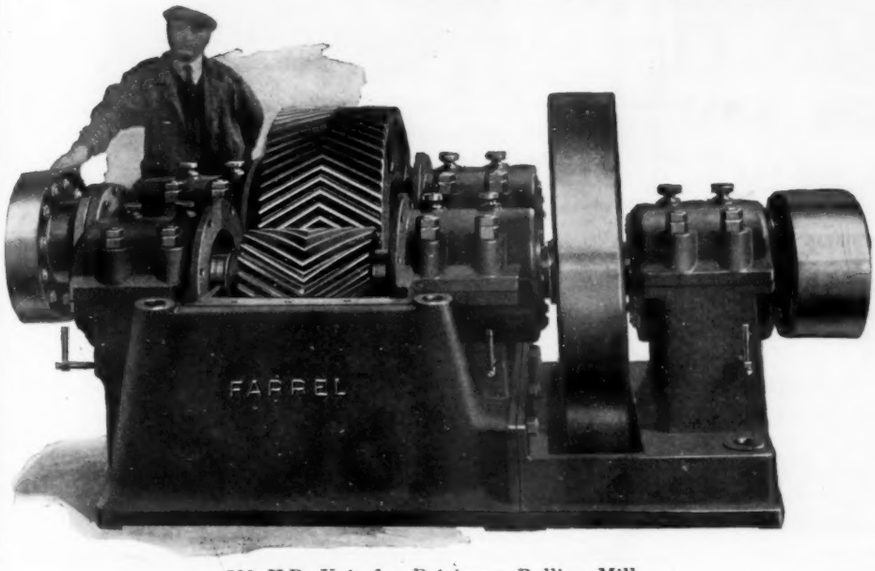

500 H.P. Unit for Driving a Rolling Mill

SPECIAL DESIGNS STANDARD GEAR UNITS or GEARS ONLY

The unit shown above is one of our series of standard units adapted to suit special conditions in a steel mill.

Advantage should be taken of our engineering service because we often find the same problem arising in different localities.

The unit illustrated transmits 500 H.P. from 780 to 225 R.P.M. and has already shown itself capable of transmitting a momentary overload of about 200%.

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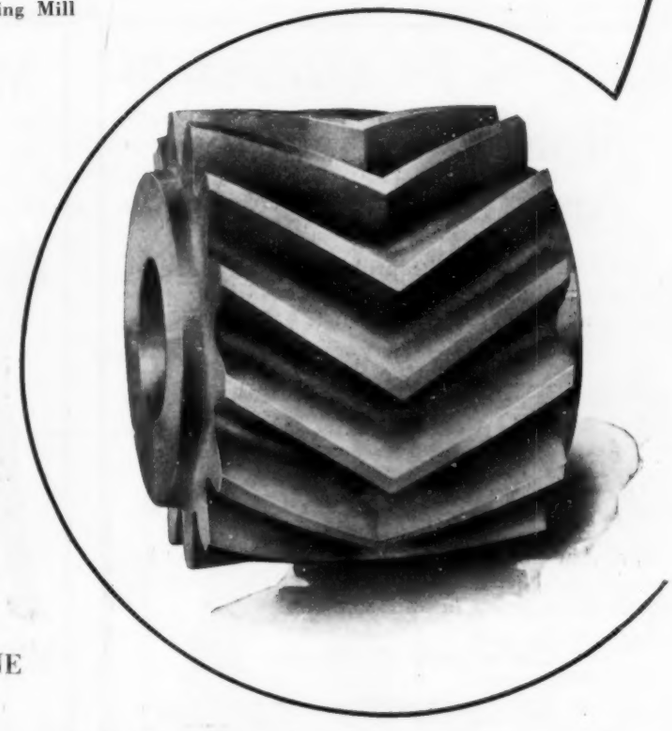
In addition to our series of enclosed drives we supply mill pinions up to 1 D.P. and 28" face made of cast steel, forged steel, or hardened alloy steel.

They are at least 40% stronger than other types and by reason of the helix angle of 30° will transmit loads uniformly and will not deteriorate from the effect of shock.



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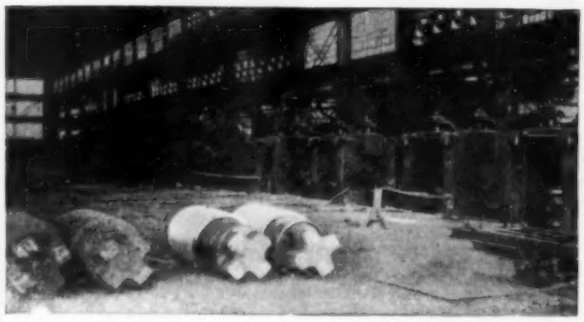
"Over One Hundred and Twenty Years of Service"



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MAKING THE MILL ROLLS
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ALUMINUM, BRASS, COPPER AND NON-FERROUS INDUSTRIES

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"Each Roll a Better Roll"

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Established 1803 at Pittsburgh, Pa., U. S. A.
"The Best in Rolling Mill Machinery"

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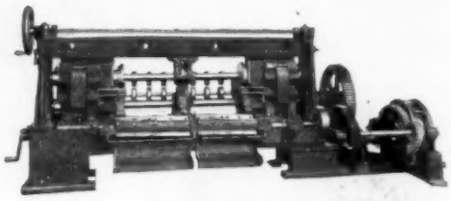
Machinery for the manufacture of Sheet, Strip, Tubing, Rod, Wire and Cable, in non-ferrous metals.



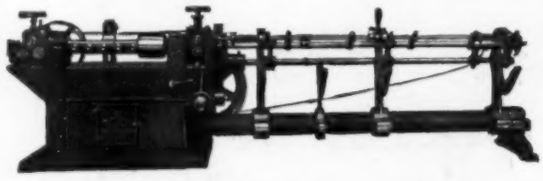
Adjustable 3-Blade Trimming Machine with Scrap Cutter

THE TORRINGTON MFG. CO.
Designers and Builders of Special Machinery
TORRINGTON, CONN., U. S. A.

Wherever Wire Is Straightened and Cut

Shuster Machines Are Indispensable

for we have met all the problems with a line of equipment that permits tremendous daily production at surprisingly low cost.



Our machines make the wire perfectly straight, and cut absolutely accurate lengths; coil after coil, day in and day out.

Let us send Catalogue

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Straightener Specialists
New Haven, Conn.
Established 1866

Metal Spinning Lathes

Tools, Chucks and Accessories for Round and Oval Work

22″ Oval Spinning Lathe with Compound Slide Rest

Sizes of the Regular Machines run from 15″ to 26″ Swing and the Extension or Gap Type Lathes will be furnished in 22″ x 44″ Swing Size, and 27″ x 60″ Swing Size.

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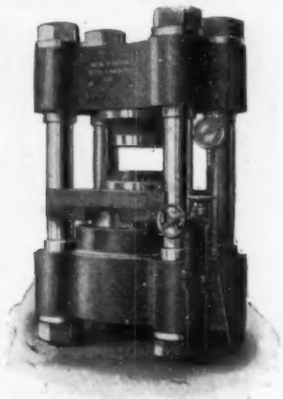

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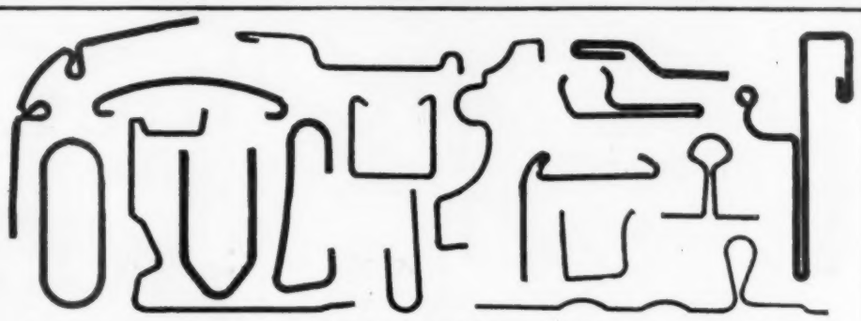
The LH 4
Yoder Strip Rolling Machine



A few of many sections (full size) rolled from Steel, Zinc, Copper, Brass, Aluminum, etc., on the Yoder Strip Rolling Machines.

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Your supply house sells them.

UPWARDS OF 600

American manufacturers of metal parts are regularly using Beaver Pebs for removing burrs from stampings and for smoothing the work preparatory to plating and polishing, and for burnishing after plating.

Remarkable savings both in first cost of material and working time are being accomplished. Write for descriptive matter, samples and prices.

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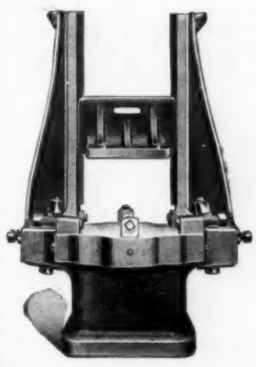

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For All Purposes

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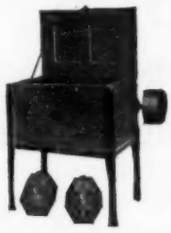
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THE BOLAND SYSTEMS FOR FACTORY INSTALLATIONS
Tanks, Coloring Rooms, Dynamos, Sawdust Boxes

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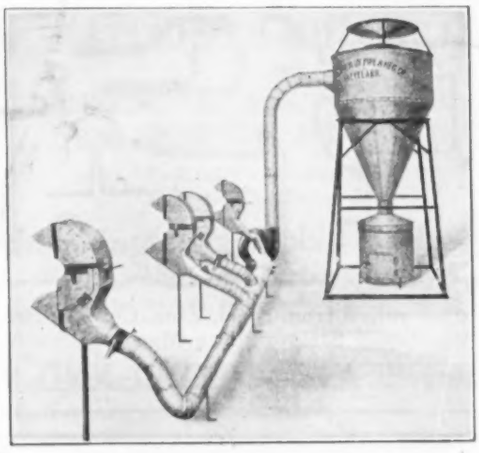

Dust Collecting Systems

for Buffing, Polishing and Emery Wheels.
Wood-Working Machinery.

Write us your troubles

We also make Machinery Guards, Sheet Metal Shower Baths and Wash Sinks, Sand Blast Cabinets, Spraying Hoods, Sawdust Drying Boxes.

The Cleveland Blow Pipe & Mfg. Co.
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GET BETTER RESULTS
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CORCORAN PLATING TANKS

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Established 1865

Chemical Lead Burning

Lead Chemical Equipment

LEAD LINED TANKS

Lead Linings for Tanks, Vats, etc.; Lead Coils; Lead Sleeves; Agitators; Lead, Acid Jugs and Carboys; Acid Waste Line; Lead and Lead Lined Pipe and Fittings; Special Lead Traps and Drain Boxes; Pure Tin Linings for Vessels of Every Character

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Electroplating Generators
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50 up to 10,000 amperes

Sturdy—Efficient—Dependable

Up-to-date apparatus in every detail; leaders in this line. Write for Bulletin.

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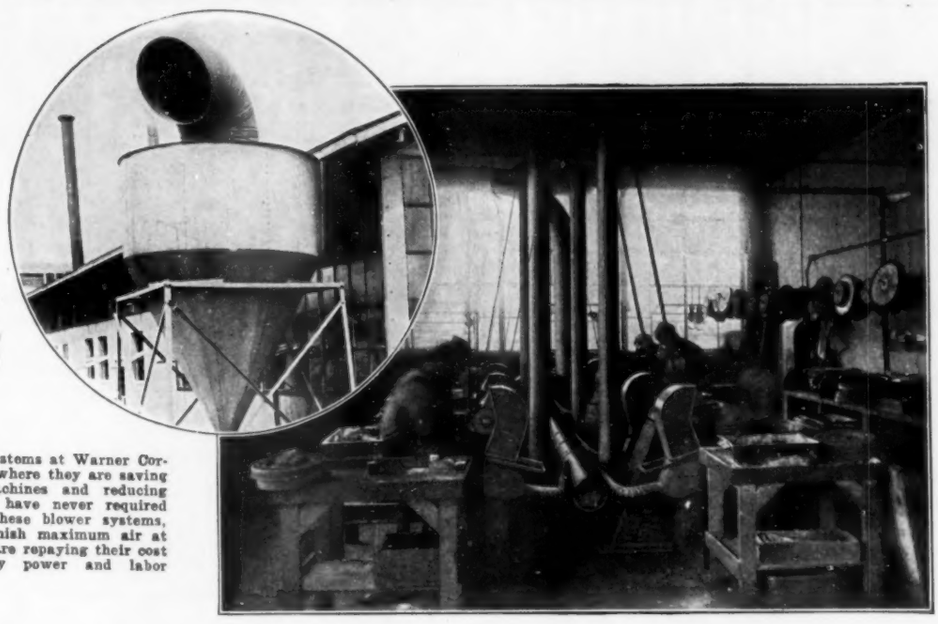


Kirk & Blum systems at Warner Corporation plant, where they are saving motors and machines and reducing labor turnover, have never required any repairs. These blower systems, designed to furnish maximum air at minimum cost, are repaying their cost in 3 years by power and labor savings.

Getting 95% of the Dust with 20% Less Power

The new Kirk & Blum catalog, just off the press, is a complete description of the most approved design, construction, and application of dust collecting equipment in wood-working and metal-working plants, glass, chemical and other industries.

Write for your copy today or just send the coupon below.

W. W. Smith, Resident Engineer, Warner Corp., Division of Durant Motors, Inc., Muncie, Ind., says:

"Our men in the polishing and buffing department tell us we have the cleanest shop in Muncie. Our Kirk & Blum blower system with K & B Economy Hoods, gets at least 95% of the dust and lint. We have reduced motor and machine maintenance, our men are more content and labor turnover shows marked reduction.

"Five years ago we called in Kirk & Blum engineers to design a blower system to remove scale and dust from tumblers and disc grinders. A K & B system to remove cast iron dust from rotary millers, one in our polishing department, and another to remove cyanide fumes, were later installed. No competing firms were called in on these last three jobs. Our own experience and our observation in other plants proved to us the economy and efficiency of Kirk & Blum installations.

"All our K & B systems are designed to furnish maximum air at minimum power cost, and to allow for future expansion. We believe that their superior design is saving us 20% in horsepower, over what the average blower system would require. Our 4 systems have a combined horsepower of 75, and cost $3,560.00 a year to operate. This figure covers depreciation, $300.00; average interest, $160.00; maintenance and repair allowance, $100.00; and power cost, $3,000.00.

"The estimated saving in horsepower, figured at $40.00 per horsepower year, amounts to $750.00. We are saving one man's time, or $1,000.00 per year, in cleaning labor. Our total saving is over 3 times as much as the depreciation, interest, and maintenance, so that the 4 Kirk & Blum systems will repay their original cost in 3 years."

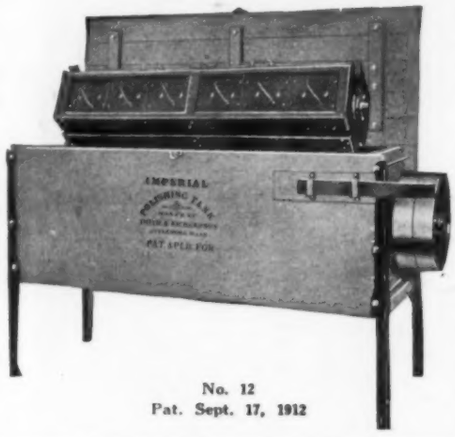
A copy of this complete report will be sent to interested plant executives who will ask for it.

THE KIRK & BLUM MANUFACTURING CO.
2859 Spring Grove Avenue, Cincinnati, Ohio
Detroit Office, 3-129 General Motors Bldg.

M. I.
The Kirk & Blum Mfg. Co., Cincinnati, O.
Please send copy of your new "Kirk & Blum Blower System," catalog
Firm Name.....
Individual Name.....
Address.....
City.....
State.....

Mail Coupon Today

KIRK & BLUM
Blower Systems
Collecting - Conveying - Ventilating



No. 12
Pat. Sept. 17, 1912

Imperial Patented Multiple Compartment Machines

are made to withstand production strains. These machines positively cut polishing costs.

These machines are made in sizes from two to six compartments. Unequalled for the manufacturer who wishes to polish a number of different kinds of small parts at one time and keep each kind separate.

We make seven stock sizes of this machine and can build them in special sizes if wanted.

We also build several sizes of single compartment machines and carry a complete stock of steel balls, cones, spickets and soap powder for burnishing purposes.

We Solicit ARTICLES
for
FREE DEMONSTRATION

Smith, Richardson Co.

Attleboro, Mass.

Sherardizing—Udyliting—Chromiliting

Zinc Alloying Cadmium Plating Chrome Plating

Our plants capable of handling all classes of materials.

Capacity unlimited.

SHERARDIZED
ZINC ALLOYED METALS
TRADE MARK

Manufacturers of Sherardizing furnaces and equipment.

Write for catalogue.

The New Haven Sherardizing Company

and

The Chromilite Process Corporation

MAIN OFFICES
868 Windsor St., Hartford, Conn.

BRANCH PLANTS
911 Sweitzer Ave., 1033 S. High St., Akron, Ohio

Representatives for The Metals Protection Corp. and Udylite Process Corp. For Udylite and Chromilite Plants.

Protects Capillarity— Prevents Contamination

An Improved Container for the Improved Abrasive

A KEG that delivers abrasive grain to you in the same perfect condition as when packed and that allows you to maintain this condition in your plant right down to the last ounce—this is the latest contribution of Norton research engineers—and an exclusive Norton feature.

To get at the contents the whole head of the keg does not have to be knocked out exposing the abrasive to moisture and dirt. A small and easily replaceable bung allows you to remove the desired quantity of grain and then again seal the keg. The capillarity of the abrasive is maintained down to the last ounce.

NORTON COMPANY, WORCESTER, MASS.
New York Chicago Detroit Philadelphia Pittsburgh Hartford
Norton Company of Canada, Limited Hamilton, Ontario

NORTON
POLISHING ABRASIVES

Did You Ever

STOP

To Think

how much you pay for cheap and low priced buffing compounds?

It will pay you to stop right now and figure this out.

You pay a little less for other compositions in cash only but you pay a lot more in inefficiency and rejections.

The best ingredients obtainable are used to make up Peerless Products.

PEERLESS PRODUCTS

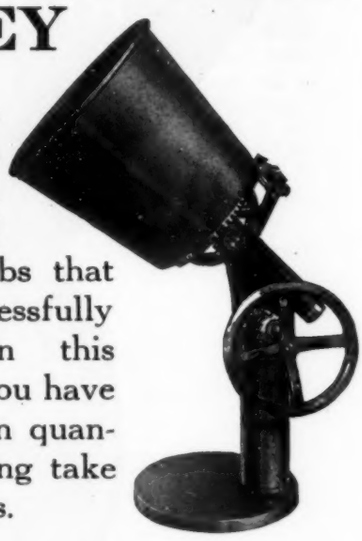
TRIPOLI
WHITE STAR COLORING
EMERY COMPOUND
CROCUS
GREASE STICK
and
Radiant White Finish

Use Stutz Compositions and Save Those Dollars

GEORGE A. STUTZ MFG. CO.
1643-47 Carroll Ave. Chicago, Ill.

Samples will be sent on request. Advise kind of metal it is to be used on and Speed of Lathe.

A BETTER JOB FOR LESS MONEY



There seems to be no limit to the quantity and shape of jobs that can be successfully enameled in this barrel. If you have a problem in quantity Japanning take it up with us.

THE HENDERSON BROS. CO.
The Tumbling Barrel People
135 So. Leonard St. Waterbury, Conn.

Clean
CUTTING
Fast
CUTTING
with
IMPROVED KEYSTONE
EMERY
GRAINS

There is no better time than *now* to put Improved Keystone Emery to the test. Its keen cutting and perfect polishing qualities are bound to make you a steady user.
Write for a sample.

KEYSTONE EMERY MILLS
Plants at Philadelphia, Pa., & Lockport, N. Y.
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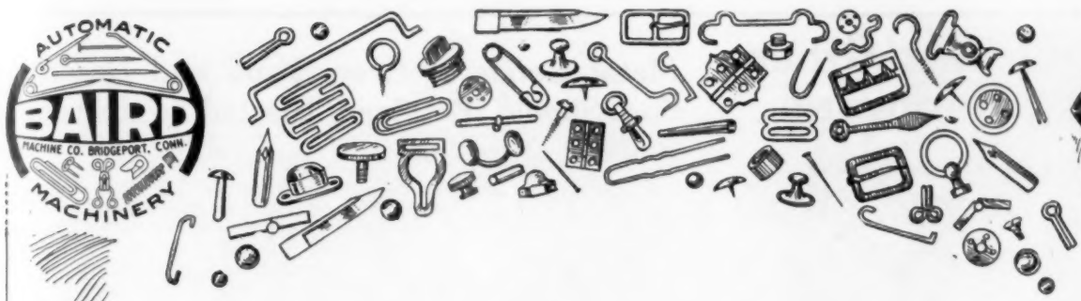


Save Space
Save Time
Increase Safety

Use the Baird Automatic Tilting Attachment on Your Baird Tilting Tumblers

This attachment, driven by a belt from your main line, is a gearing mechanism which automatically raises and lowers the barrel and can be set to stop at the position desired—up or down.

Simply moving a lever in front of the machine is all the operator has to do.

This attachment can be applied to any No. 2 Baird Tilting Tumbler.

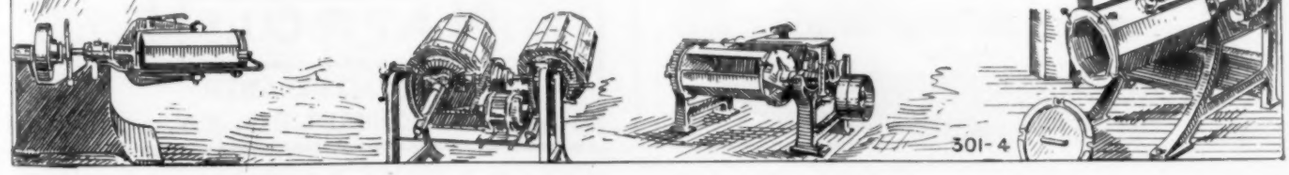
"Ask BAIRD About It"

In addition to tumbling barrels, The Baird Machine Company is the world's leading designer and builder of Automatic Machines to produce articles from wire and ribbon metal.

THE BAIRD MACHINE COMPANY

BRIDGEPORT, CONN.

Geo. H. Alexander, Mchy., Ltd., Birmingham, England, for automatic machinery.
Geo. Cruickshank, Ltd., Birmingham, England, for tumbling barrels.
Fenwick Freres, Paris, France, with branch offices in Belgium, Switzerland, Italy, Spain, Portugal and Brazil.



301-4

Gears Tools *and* Other Hardware Articles *Cleaned of Scale*

And Improved in Color
RAPIDLY
and DRYLY

Same Sand Used Over and Over

A press of the foot controls the flow of sand through the nozzle. The work is held in the hand and moved about to effect all angles. The hands are not affected and the work cannot be spoiled. Even the most inexperienced gets the best results at the first try.

Metal Goods of Every Kind and Description Should Be Sand Blasted to Increase Plating Durability.

The sand blasting process is fully treated in our catalogue. It improves your plating, making a surface to which the plate will adhere to more securely and much more rapidly and so sand blasting saves time in plating, and improves your finish—very desirable ends, you will agree. This also applies to articles to be painted, sprayed, enamelled or otherwise treated. Mat finishes of various degrees are quickly secured.

LEIMAN BROS.

Automatic, Continuous Feed
SAND BLAST

Is a strongly built machine that lasts for many years, yet it is not expensive. It does the work with less effort and expense than all other makes —That's why the most discriminating concerns use this one.

No Dust Collector or Arrester Needed

No expensive parts to wear out and require renewal—all are very sturdily made of common material and are very low priced to replace and you can get them everywhere because they are in common use for other purposes everywhere.
No chance for this simply constructed machine to clog up or get out of order—a common occurrence with higher priced machines.

Our complete illustrated catalog is free for the asking.

LEIMAN BROS.
Makers of good machinery for nearly half a century

23 WALKER STREET
NEW YORK

LIONITE — KING OF ABRASIVES — NIAGARA FALLS, N.Y. — GENERAL ABRASIVE CO.
Trade Mark

Your Polishing Department Needs
LIONITE
THE ELECTRIC ABRASIVE

A Massachusetts Maker of Stamped Goods Says:—
"The 100 pounds of No. 80 H.T. Lionite abrasive has proven to be very satisfactory."
(Name given on application.)

Our Booklet on MODERN POLISHING will interest you.

GENERAL ABRASIVE CO. Niagara Falls, N. Y.

TRI-B BRAND

5 POUNDS it makes no OR TONS difference

Buchanan Brand COPPER CARBONATE

is a quality product, light, dry and readily soluble.
If you want old-fashioned plastic, guaranteed, we can tell you something about it.
Quality makes an impression. Get prices on your requirements.

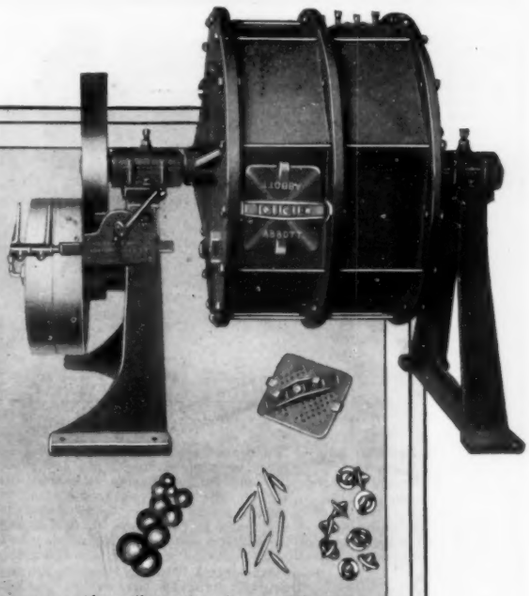
Buchanan Brand COPPER CARBONATE
Since 1919.

ASK YOUR JOBBER OR THE
C.G. BUCHANAN CHEMICAL CO.
CINCINNATI - - OHIO.

I Wish You A Very Merry Christmas
And
A Happy New Year!
Wilfred H. McKeon
PRESIDENT

"Liquid Sulphur"
(The Oxidizing Agent of Today)
AND
NATROLIN
TRADE MARK
METAL CLEANER
GREENSBURG, PA.

Rush!



How many times have you seen this written across the face of an order? How many times have you found out that immediate delivery could not be made because of delay in your finishing department? Perhaps *your* finishing department is able to keep up with the rest of your plant, but how much of your polishing expense may be eliminated by installation of Abbott Ball Burnishing Equipment? One Abbott outfit will average as much work as from eight to fifteen hand finishers. One manufacturer has been able to dispense with 150 hand polishers by installing Abbott Barrels.

Send us samples. Put it up to us to show how you can finish your small metal parts quicker, at less cost and better. This obligates you in no way.

Above illustration shows a 36" x 8" two compartment barrel; also burnishing balls, pins and cones. Barrels are made in various sizes and can be furnished with either single compartment, two compartments or three compartments

The Abbott Ball Company

"Originators of Commercial Ball Burnishing"

1046 New Britain Avenue, Hartford, Connecticut

Borolon
TRADE MARK

POLISHING GRAIN

Borolon Polishing Grain (Electric Corundum) is the product of our own electric furnaces. As Manufacturers we control uniformity of grain which assures satisfaction to the user. All regular grain numbers supplied in eight different sized containers. Write for samples and prices of the numbers you regularly use.

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District Office: 149-65 Larned Street, East, DETROIT, MICHIGAN

SEE TEXT PAGE 514

for information regarding the

FIFTEENTH ANNUAL BANQUET

of the

CHICAGO BRANCH

American Electro Platers Society

ADVANCE POLISHING WHEELS

Look for ◇ *the Diamond*

Catalog No. 8 upon request

Advance Wheel Mfg. Co., Inc.

618-622 West Lake St.
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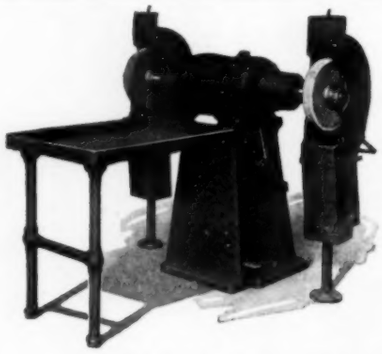
DETROIT
TEL. EMPIRE 3393



160 of these Cisco Lathes on one floor!

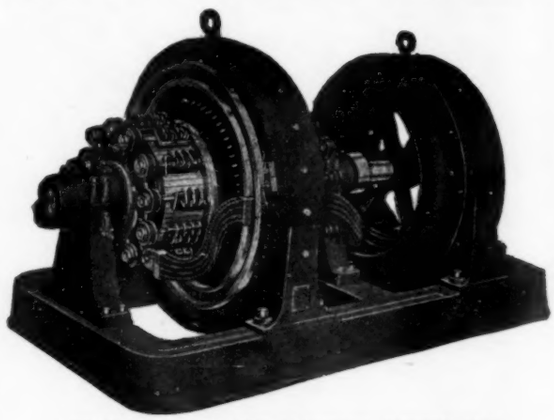
Send for Bulletin and prices on Cisco Grinding, Polishing and Buffing Lathes. Four sizes—3, 5, 7½ and 10 hp., all with individual motor drive and dust-collecting hoods as illustrated.

We recently completed an installation for a large new plant, including 160 Cisco Polishing and Buffing Lathes like that illustrated, all on one floor, each machine with individual motor drive. Cisco Polishing Lathes are made in four sizes, 3, 5, 7½ and 10 hp., completely self contained, enclosed, and dust-proof. Static and dynamic balancing insures vibrationless running. Automatic push-button control standard equipment. A highly perfected machine that meets every test of hard service.

The Cisco Machine Tool Company
1784 Elmore St., Cincinnati, O.

CISCO
Engine Lathes · Polishing · Buffing *and* Grinding Lathes

ELECTRO AND MOTOR GENERATORS



5,000 Ampere, 6 Volt Motor-Generator, Interpole Type

THE BEST for Electro Galvanizing, Electro Plating and all purposes for which low voltage generators are used. We furnish synchronous motors with our large generators. These motors operate with 100% power factor and assist in building up the general power factor in the plant.

Particulars and Catalog on Request

THE EAGER ELECTRIC COMPANY
Watertown New York

THE WHIRLING DERVISH REVOLVES RAPIDLY AND ACCOMPLISHES NOTHING

THE RICHARDS ROTARY PLATER REVOLVES SLOWLY

AND PLATES THREE TIMES FASTER THAN YOU ARE NOW DOING

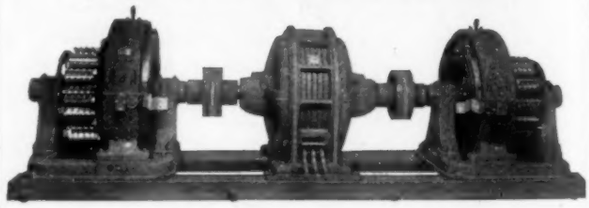
PATENT NO. 116,228

WRITE FOR BULLETIN 104

LASALCO
Inc.
2828-38 LaSalle St.
St. Louis, Mo.

COMPLETE PLATING PLANTS

J & L GENERATORS



J. & L. Direct Current, Motor Generator for Electrolytic Work, Electroplating, and General Deposition of Metals. Built in Sizes from 200 to 10,000 Amperes.

Maintaining

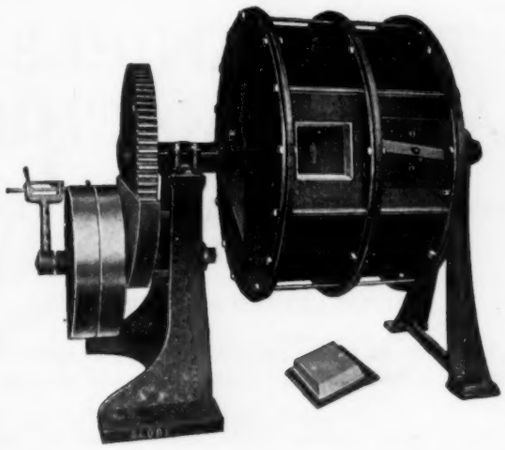
CONSTANT VOLTAGE with all changes of load in amperes. VOLTAGE is adjustable from 2 to 8 volts; in the larger sizes from 2 to 12 volts. At whatever point the voltage is set for, to the full range of the generator, this voltage will remain constant for all changes of load in amperes to the full capacity of the generator.

OUR SERVICE DIVISION

is at your service and prepared at all times to give you assistance with your plating problems, with technical and practical experience to scientifically determine your requirements.

THE JANTZ & LEIST ELECTRIC CO.
Western Avenue and York St. Cincinnati, Ohio

GLOBE TUMBLING BARRELS



THE GLOBE MACHINE & STAMPING CO.
1265 W. 76th St., Cleveland, Ohio

BY using sawdust, sandstone, emery or other abrasives, castings, stampings or other metal parts with rough surfaces can be cut down very rapidly.

Plants using Globe Tumbling Barrels have reduced production costs and increased profits.

"MATCHLESS" CHROMIUM COMPOSITION

A new Matchless product for chromium plate.

TRADE MARK
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REG. U.S. PAT. OFF.

Gives a wonderful lasting color and lustre.

Write for Sample.

THE MATCHLESS METAL POLISH CO.
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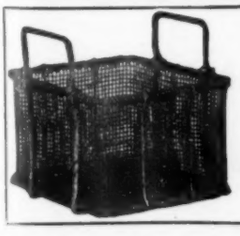
"JIM DANDY" BUFFS save you money
Buy Your Loose and Sewed Buffs direct from Manufacturers
THE ODEN CORPORATION
College Point, L. I., New York City
COMPOSITIONS BUFFS PLATERS' SUPPLIES



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Made of
Iron, Steel, Galvanized, Brass, Copper, Aluminum, Monel and Calido.
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THE JOHN P. SMITH CO.
493-501 State St., New Haven, Conn.

AMERICAN TRIPOLI COMPANY
(Incorporated 1892)
Subsidiary of Barnsdall Corporation
SENECA, MISSOURI, U. S. A.
Cable Address: "Tripoli, Seneca"

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"Be Square" Products

THE DANIELS PLATING MACHINE

FOR PLATING SMALL ARTICLES IN BULK

OUTSTANDING FEATURES

☞ The operating mechanism and electrical conductors are free of the solution, which prevents the waste of metal and power.

The constant rotation of the work, anodes and solution causes thorough agitation, resulting in a uniform deposit.

The machine is so designed that the work can be inspected while in operation.

HIGH EFFICIENCY—LOW UPKEEP

Manufactured by

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Type F Patented

THE DANIELS & ORBEN CO., Inc.

Electroplating and Polishing Equipment and Supplies

81 Walker St., NEW YORK CITY — 353 Mulberry St., NEWARK, N. J.

Our New Year's Pledge!

We promise to keep up the good work of manufacturing Nickel Anodes from the finest Virgin Nickel. Guarantee all percentages according to specifications. Give prompt delivery and always be at the service of our customers.

Signed

Anode Corporation of America.

Manufacturers of **Nickel Anodes** also **Anodes Made From Brass, Bronze, Copper, and Zinc**

Salesroom 489-493 Broome St. **New York City, N. Y.**

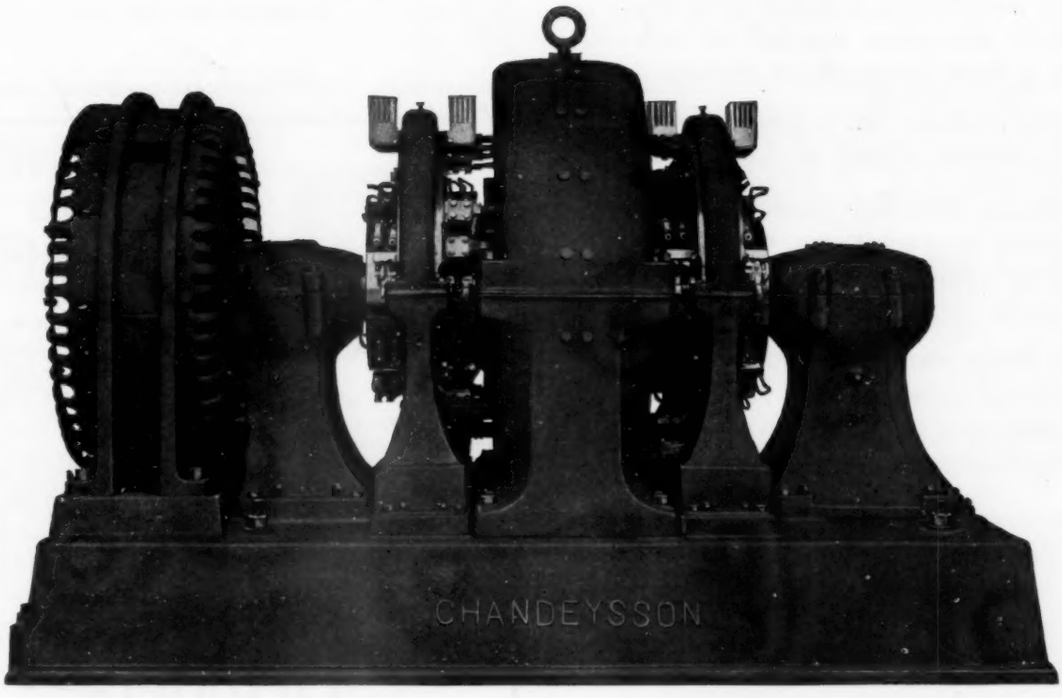
Chandeysson

Generators

25 to 25,000 Amperes

Direct Connected to

GE **Motors**



50-h.p., 300-r.p.m.
G-E Synchronous Motor

5000-amp., 6-volt;
2500-amp., 12-volt Generator

CHANDEYSSON ELECTRIC CO., St. Louis

GREASELESS COMPOUND

for

METAL FINISHES

The Dry Method that eliminates the final washing and drying operations.

Lea Compound is for producing brush brass or satin finish.

Lea Compound does its work by producing a quick cutting, dry, abrasive coated wheel. It is free from oil or grease.

The work is taken direct from the wheel to lacquer.

Many leading concerns report economies of more than half their finishing costs.

A large sample tube and full instructions will be sent from any distributor or from the factory.

Distributors for LEA GREASELESS Compound

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REYNOLDS-ROBSON SUPPLY COMPANY
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THE ODEN CORPORATION
College Point, L. I., New York.

M. M. MAYER
109 East 12th Street, New York City.

GEORGE A. STUTZ COMPANY
1645 Carroll Ave., Chicago, Ill.

BOSTON PLATING SUPPLY COMPANY
202 Friend Street, Boston, Mass.

The LEA MANUFACTURING Co. 987 Watertown Avenue WATERBURY CONN.

We Can Beat Anybody's Price Give Better Quality

White nickel over copper plating done on Broderick Automatic Plating Machines. Our capacity is really unlimited.

It would pay you to get in touch with us for plating of all kinds.

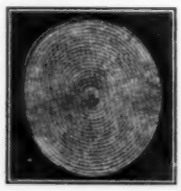
We still have a quantity of used plating equipment for sale.

A. A. BRUNELL CO.

INCORPORATED

WORCESTER, MASS.

A. A. Brunell, *Pres. and Treas.*



GUARANTEED BUFFS

Buffs that give Satisfaction wherever placed

"Grade A" for Low Price
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Loose Buffs in various qualities to suit all classes of work.

We invite correspondence direct from TRADE

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Polishers Buffers Grinders

Motor Driven—Floor and Bench Types "with the adjustable bearings"

Cleveland Armature Works

INCORPORATED

4734 St. Clair Ave., Cleveland, Ohio

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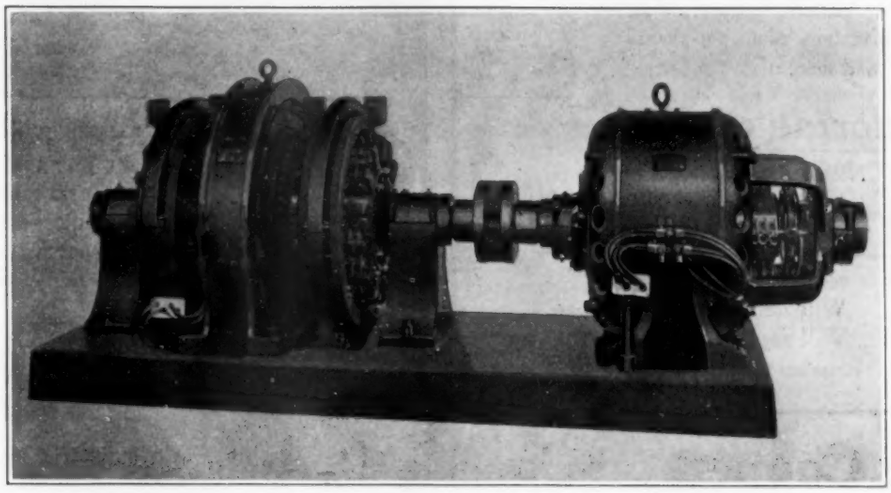
Progressive Establishments Demand Ideal Electro Plating Generators and Motor-Generator Sets

THREE OF OUR REPRESENTATIVE TYPES



9000 ampere 6-12 volt Generator, 75 H.P. 230 volt Direct Current Motor, 385 r.p.m.

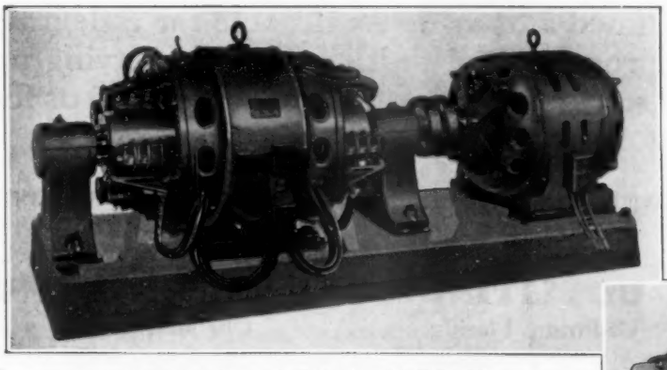
Type HP—2000 to 10,000 ampere

A complete line of Electro-Plating Generators, belt drive, and motor-generator sets ranging from 50 to 10,000 amperes, either 6 or 12 volt, two or three wire, in standard sizes.

Thirty years of experience in this field gives you the best. The simple and high perfection of design and construction worked out by expert engineers insures a dependable constant voltage, high efficiency unit

THE IDEAL ELECTRIC & MANUFACTURING CO.

MANSFIELD, OHIO



1500 ampere 6-12 volt Generator, 15 H.P. 220 volt, 3 phase, 60 cycle Motor. 1150 r.p.m.

Type DP—1000 to 2000 ampere

Ideal generators are designed and built especially for electroplating work.

We specialize in low voltage, heavy current electric machinery.

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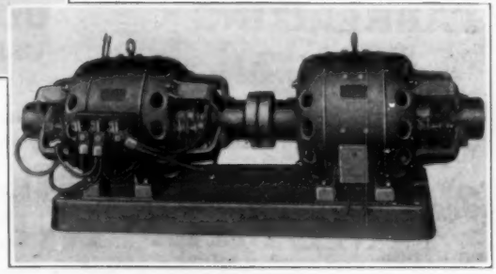


750 ampere 6-12 volt Generator, 7½ H.P., 125 volt, direct current motor. 1150 r.p.m.

Type DP—50 to 1000 amp.

Platers' Chemicals

COOPER'S CERTIFIED CHEMICALS

Carbonate of Copper

50% Metallic Copper yields the maximum plate per pound and more plate per hour.

Chloride of Nickel

In Nickel Plating Cast Zinc

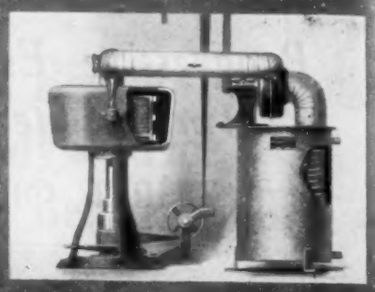
Chromic Acid

For *new* method of plating.
Will not tarnish
Will not corrode
Requires no polishing

Chas. Cooper & Co.

196 Worth St. New York City

Works: Newark, N. J. Manufacturers Since 1857



DRY METAL SMALL PARTS QUICKER, CHEAPER ....AND WITHOUT SAWDUST!

Two to five minutes and your metal small parts are dried in quantities—dried without spot or tarnish!

Write for full information.

TOLHURST CENTRIFUGAL METAL DRYER

TOLHURST MACHINE WORKS
TROY, N. Y.
New York Office, 30 Church St.

You Can Salvage Odd Metal Parts!

WILL your shop inventory show a stock of idle metal parts? These could be reclaimed and made serviceable for a definite purpose, if they had the proper metal finish. Instead of tying up good money in such dead stock, why not send the material to us for re-finishing—that's part of our service. Why scrap good metal?

We can serve you completely on any metal finishing problem and specialize on

PARKERIZING — Rust Proofing

UDYLITING — Cadmium Plating

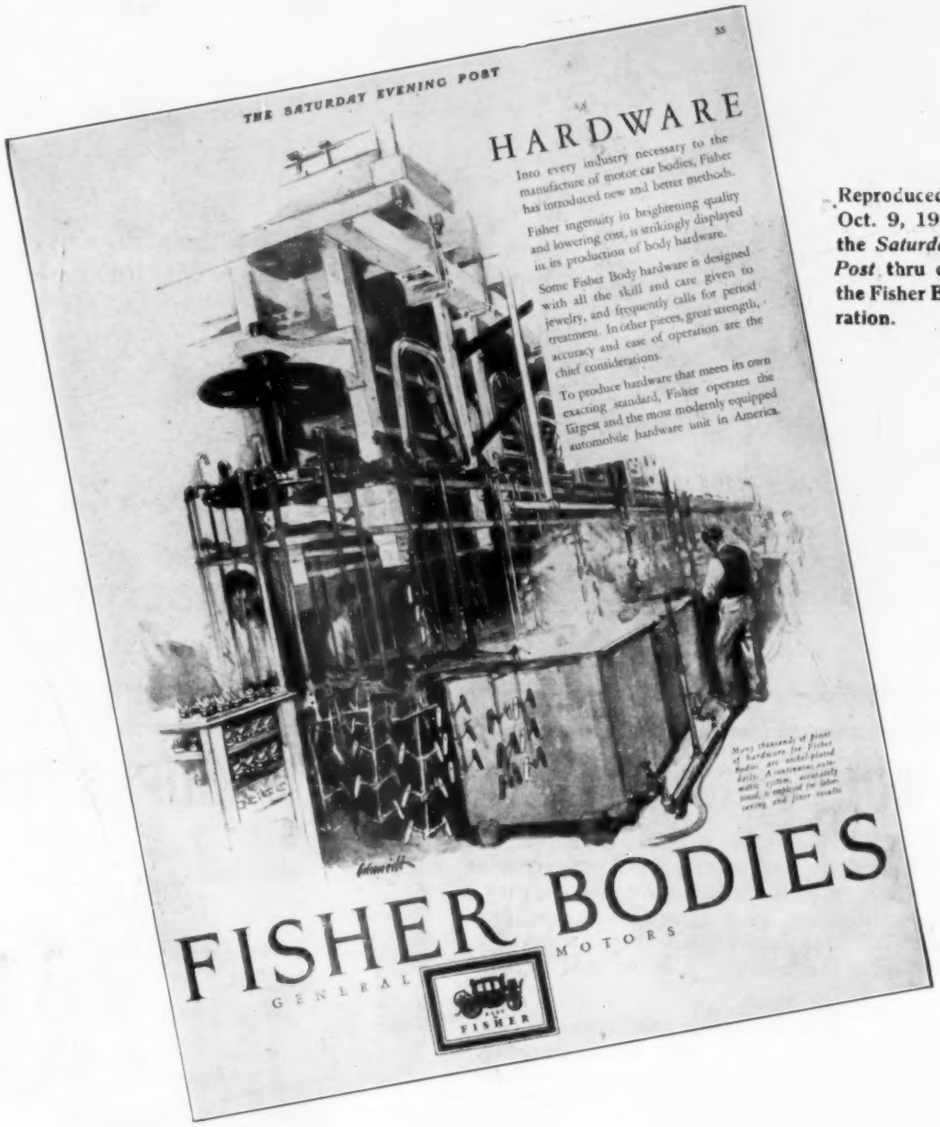
CHROMILITING — Chromium Plating

The Parkerizing, Udylite and Chromilite requirements of certain manufacturers are such as to demand an individually operated department. We are prepared to afford complete engineering service in such cases and install the particular equipment required.

METAL FINISHING DIVISION

PYRENE MANUFACTURING COMPANY
560 BELMONT AVENUE NEWARK, NEW JERSEY

Manufactured by *Munning*


THE SATURDAY EVENING POST
55
HARDWARE
Into every industry necessary to the manufacture of motor car bodies, Fisher has introduced new and better methods.
Fisher ingenuity in heightening quality and lowering cost, is strikingly displayed in its production of body hardware.
Some Fisher Body hardware is designed with all the skill and care given to jewelry, and frequently calls for period treatment. In other pieces, great strength, accuracy and ease of operation are the chief considerations.
To produce hardware that meets its own exacting standard, Fisher operates the largest and the most modernly equipped automobile hardware unit in America.
FISHER BODIES
GENERAL MOTORS
FISHER

Reproduced from the Oct. 9, 1926 issue of the *Saturday Evening Post* thru courtesy of the Fisher Body Corporation.

THOSE who have achieved supremacy give approval only to products of outstanding merit.

The above advertisement, *reproduced from the Saturday Evening Post,* features a Munning Full Automatic Plating Conveyor in operation in the hardware plant of the Fisher Body Corporation. Recently, two additional Munning Full Automatics have been installed, making the Fisher hardware unit one of the largest automatic plating plants in the world.

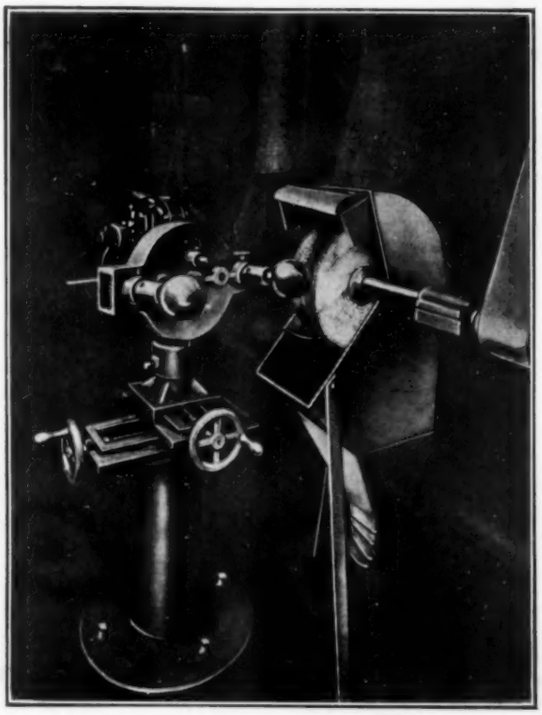
Performance merits recognition. The Fisher Body Corporation is only one of many nationally known concerns who have installed Munning Full Automatic conveyors for greater production and finer results.

A. P. MUNNING & Co.

Manufacturers of Electroplating and Buffing Apparatus and Supplies

Factories— MATAWAN, N. J. *and* CHICAGO, ILL.

Sales Offices and Agencies in Principal Cities



Automatic Buffing

Pays Large Returns

Photo shows Type "A" two spindle machine buffing andiron tops.

Firm in Connecticut shows better than 100% savings over the hand method with inexperienced help on the machine. This is just one of the many jobs they do.

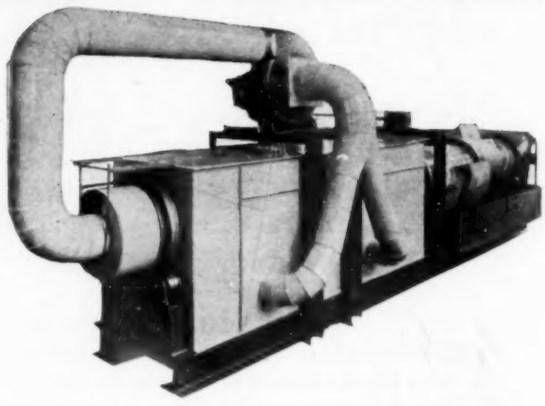
Send your samples and let us tell you how to save.

We Make Other Types

Acme Manufacturing Co.

1645 Howard St. Detroit, Mich.

NUT - BOLT - SCREW - STAMPING MANUFACTURERS



ILLUSTRATED is a NO DUST Machine recently installed by one of the most progressive nut and bolt manufacturers in the country. With this machine they now clean, rinse and dry more material in three hours than they previously did in a day—and the work is cleaner and better, too.

NO DUST Machines are constructed for feeding nuts, bolts, stampings, screws, etc., into a hopper, after which they are automatically passed through any desired solution or combination of solutions in any order. These machines may be equipped with the NO DUST Dryer, which thoroughly dries materials by hot air and without the use of sawdust or similar drying agents. Where desired, the NO DUST Dryers may also be had as a separate unit.

The material under treatment is automatically and systematically passed from one operation to the next, saving considerable in labor and permitting the user to obtain a much greater production. The experience of users of NO DUST Machines is that from 25 to 75% is saved in labor alone.

NO DUST Machines are now in use by many of the largest metal product manufacturers throughout the country, such as the General Electric Company, Scovill Mfg. Co., A. Schrader's Son Co., Waterbury Mfg. Co., Foster Bolt & Nut Co., Delco, Delco Lite Co., New Departure Mfg. Co., Elco Tool & Screw Co., Russell & Erwin Mfg. Co., Corbin Screw Co., E. Ingraham Co., Westinghouse El. & Mfg. Co., etc. The large number of repeat orders we receive testify to the high efficiency of NO DUST Machines.

Write for further information on NO DUST Machines. Tell us what you wish to clean, rinse, dip, neutralize, dry, etc., and we will forward full data.

NO DUST DRYING MACHINE CO. Div of Blake & Johnson Co. **WATERVILLE, CONN.**

One of the recent installations of

The H. & V. W. CO.'S FULL AUTOMATIC CONVEYOR

Direct electrical contact of carrier with cathode bars which eliminates springs and brushes.

Oil trough which permits proper lubricating of equipment without danger of contaminating solution.

Proper bracing of tanks.

IN addition to simplicity of construction, flexibility, elimination of overhead construction which permits installation of necessary hoods over hot solutions, and automatic spacing of carriers at curved end of the conveyor to prevent crowding of racks, we call attention to the above special features.

There are many other important and exclusive points which our representative would be pleased to explain.

The HANSON & VAN WINKLE CO.

Chestnut and Van Buren Streets

NEWARK, N. J.

Branch Offices: NEW YORK CHICAGO CLEVELAND DETROIT

Agencies

L. H. BUTCHER COMPANY
Seattle Portland Los Angeles San Francisco

QUAKER CITY FELT & SUPPLY CO.
Philadelphia Boston Providence

THE C. S. MERSICK & COMPANY
New Haven, Conn.

Good Buffs—

IF you want one hundred sections of buffs, or one hundred thousand, you can be sure you will get the same one good quality if you order bleached "Champion" sewed buffs, standard of quality for more than thirty-five years.

F. L. & J. C. CODMAN CO.

Factories:
15 Elkins Street, S. Boston, Mass.
13440 Klinger Ave., Detroit, Mich.

Salesroom:
82 Duane Street,
New York, N. Y.

MACDERMID—INCORPORATED
METAL
METEX
CLEANERS
WATERBURY—CONN.

THE approaching holiday season reminds us that another year is drawing to a close. This seems an opportune time to express to you our sincere appreciation for the good will which you and others have entrusted to us during 1926.

We greatly cherish the confidence and consider it as our most prized business asset.

In future it will be our constant endeavor to render through

METEX METAL CLEANER

service that will merit a continuance of this trust.

MACDERMID INCORPORATED

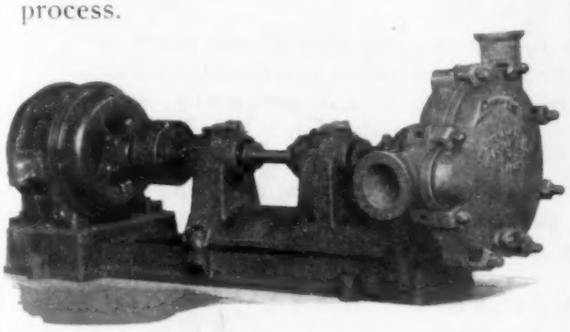
WATERBURY *MANUFACTURERS* CONNECTICUT

Prime Facts on DURIRON

1. Not affected by plating solutions.
2. Not affecting plating solutions.

These two basic facts qualify Duriron equipment for plating.

The adoption of Duriron pumps, pipe, valves and similar apparatus reduces maintenance materially and betters the process.



Duriron pumps handle commercial acids year in and year out with minimum expense and maximum efficiency.

In addition to being wholly resistant to plating solutions, Duriron's hardness resists perfectly the scoring of the sharp solids encountered.

Chemically, physically and mechanically fit for the job, Duriron installations assure uniformly good results.

Literature, samples for your test, and full cooperation of an organization expert in the problems of corrosive handling, are at your service.

Duriron is produced only by

The DURIRON COMPANY DAYTON·OHIO

CRODON

A CHROMIUM SURFACE COVERING OF GREAT HARDNESS, OF GREAT RESISTANCE TO ALKALIS, ACIDS AND OTHER CHEMICALS, AND OF BEAUTIFUL APPEARANCE.

Wherever severe service is required of any article, the preservation of the surface is essential.

It is necessary that the surface coating be hard and tenacious.

To resist atmospheric conditions of all kinds, the surface must resist oxidation and tarnish, whether due to moisture or to the presence of fumes or sulphur in the atmosphere.

To prevent the destruction of an article when submitted to alkalis, chemicals and many acids, the surface must resist these reagents.

CRODON meets these requirements.

Our engineers will be glad to confer with you on your problems, and give you the benefit of past experience in applying CRODON to your needs.

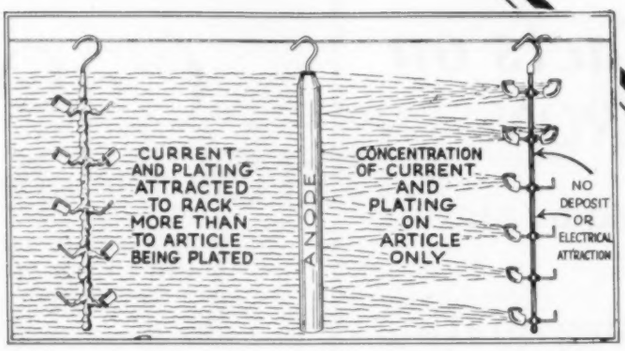
The Chromium Corporation of America is prepared to license manufacturers under the strong patents which it controls and to superintend the installation of Chromium plating units for the production of CRODON in the plants of its licensees.

We are prepared to furnish complete information so that the cost of such an installation may be worked out by prospective licensees and so that the installation of CRODON plating units may be considered by manufacturers from a strictly commercial standpoint.

We solicit inquiries from manufacturing concerns so that we may discuss their problems and suggest a solution.

CHROMIUM CORPORATION OF AMERICA
General Offices: 26 Broadway, New York City
Western Plant: Chicago, Ill.

CRODON
THE CHROME PLATE


CURRENT AND PLATING ATTRACTED TO RACK MORE THAN TO ARTICLE BEING PLATED
ANODE
CONCENTRATION OF CURRENT AND PLATING ON ARTICLE ONLY
NO DEPOSIT OR ELECTRICAL ATTRACTION

Double YOUR Generator's Capacity

WAIT—don't buy a new generator to take care of your increased production! Your present generator will plate 50% more with BELKE HARD RUBBER COVERED PLATING RACKS.

If you are putting 10,000 amperes into your tank, *fully half of this power is wasted* when plate lodges on the surface of the bare metal racks you are now using. Belke hard rubber covered plating racks are insulated, and, consequently, save half of the power, which may be used for increased production. Use BELKE RACKS—it's as good as a new generator of 15,000 amperes.

On the BELKE RACKS only the tips are exposed to plate, and they are easily replaceable, by the patented BELKE process. BELKE RACKS last a life time—the bare metal racks last, at the best, only six months, after which they are encrusted with valuable metal.

You save money on every immersion with BELKE RUBBER CLAD RACKS, and they are easier to handle. If it didn't mean money saved, would *over half the products plated in America be plated on Belke Rubber-clad racks?*

Send for the rack chart, showing a Belke duplicate for the bare metal rack you are using. Just fill out the coupon below. No obligation.

BELKE MFG. CO.,
2952 W. Van Buren St.,
Chicago.

Please send me your chart of Belke Hard Rubber clad racks, and further information on how I can increase production and use less metal and electricity.

Name.....

Address.....

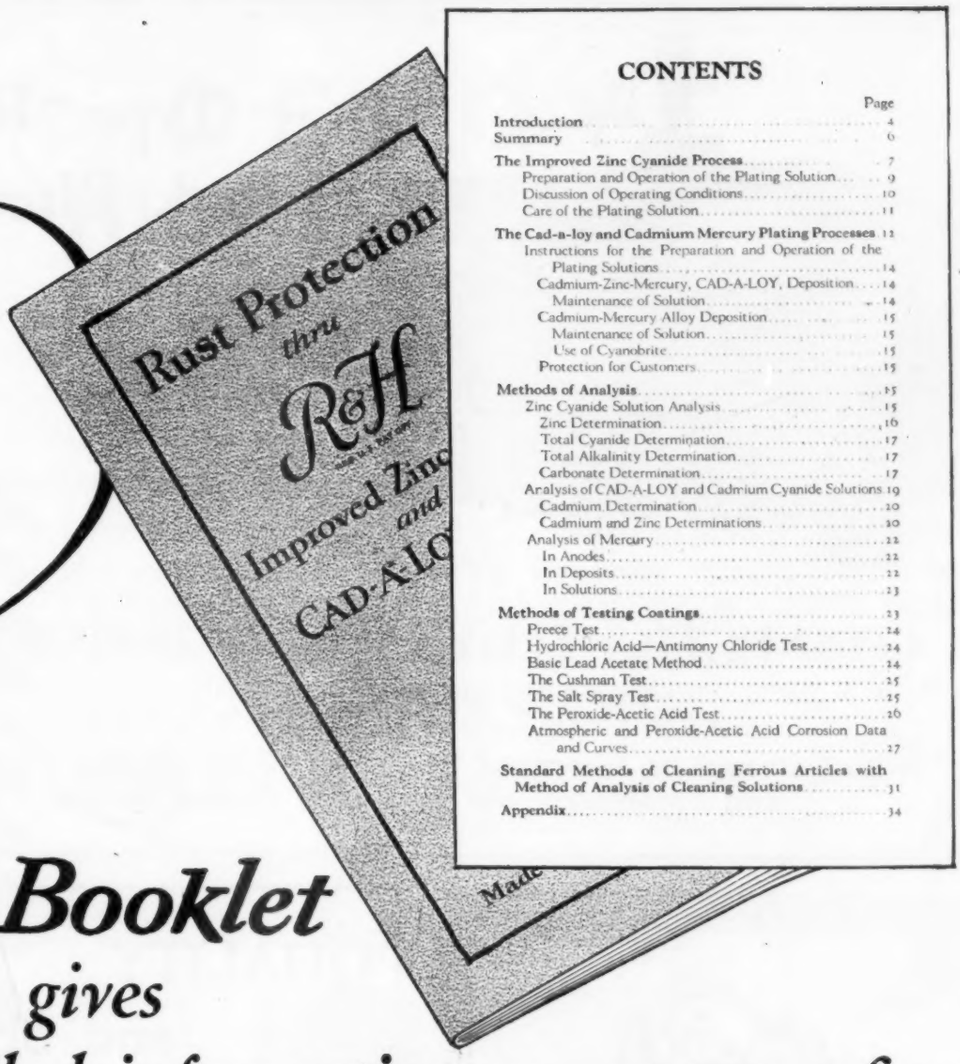
BELKE MFG. CO.

2952 W. Van Buren St.
CHICAGO

BELKE HAND ACID PUMP

As simple as getting water from the faucet—the **BELKE HAND PUMP** for removing acid from carboys is a whiz! No more heaving and tilting of the carboy to let the dangerous acid spill out and perhaps harm your men.

Pump a drop or ten gallons! Just set the **BELKE HAND ACID PUMP** on the carboy and push the handle down. Entirely lead encased for all acids. The price is within reach of all.



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This Booklet gives detailed information on rust-proofing

The facts that you should know to secure best results—the practical details that include solution formulae, corrosion test charts, etc. This information concerning the R&H Improved Zinc Process and *CAD-A-LOY Process shows how maximum rust resistance may be secured. The savings resulting from this process are worthwhile. License, based on our patents, is extended under very reasonable conditions. This Booklet is a help in plating practice —mail the coupon for your copy.

*Reg. U. S. Pat. Office.

The
ROESSLER & HASSLACHER CHEMICAL CO.
709 Sixth Avenue
New York

The Roessler & Hasslacher Chemical Co.
709 Sixth Avenue, New York

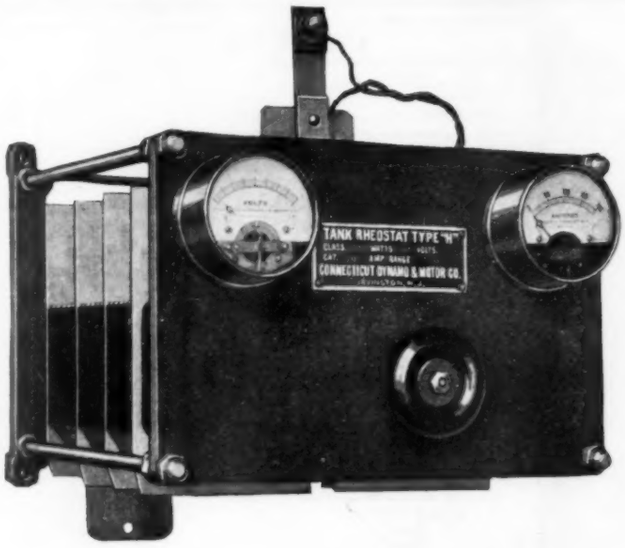
You may send me a copy of the Booklet containing facts about plating, charts, etc., in connection with the Improved Zinc Process and CAD-A-LOY (Reg. U.S. Pat. Off.) Process.

*Name*_____

*Firm*_____

*Street No.*_____

*City and State*_____



Type "H" Tank Rheostat

will regulate the voltage at the tank from zero to the full voltage of the dynamo, whether the tank is full of work or only one small piece is to be plated.

CONNECTICUT DYNAMO & MOTOR CO.

196 Lyons Ave., Irvington, N. J.

Manufacturers of Improved American Giant Plating Dynamos. The Rotoplater—the Simplified Plating Barrel.

Time alone will tell the real cost of the cleaners you use.

Ask for a free sample of:

Magnus CLEANERS

Find out how much their use will save you.

Magnus Chemical Company
Manufacturers of Cleaning Materials
718 Atlantic Avenue--Brooklyn, N.Y.

QUALITY and SERVICE

AT LOW COST

Electroplaters and Polishers Equipment and Supplies.

We solicit your inquiries

The Thos. Buchanan Company
114-116 West Pearl Street
Cincinnati, Ohio

DELOYE

BRASS—NICKEL ANODES—ZINC

Because they have a LARGER SURFACE AREA—made up entirely of EDGES with all parts of the anode at work, resulting in an EVEN DEPOSIT and EVEN CORROSION giving LESS SCRAP.

Improved Deloye

Made in HIGH PURITY—NO CARBIDES—NO SULPHUR—a very SLIGHT SURFACE SHELL; except for CARBON in GRAPHITIC FORM to bind grains of nickel and give CONDUCTIVITY there are NO ALLOYS used. CLOSE GRAINED, SOLID CASTINGS. TWO POINT CONTACT HOOK in NICKEL and COPPER with full tapered threads crushed into the anode butt gives a LARGE PERFECT CONTACT that will HOLD.

Lengths without 1½" Lug—12"—15"—18"—24" 30"—36"—42". 6" Wide x 2¼" Thick. Weigh about 1 lb. to the inch.

We Make Any Shape

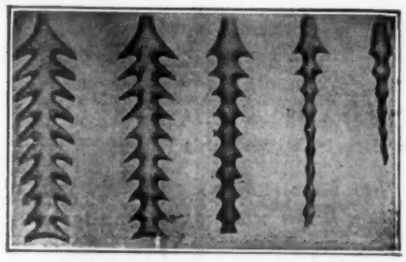


Photo Showing Corrosion of Deloye

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WATERBURY, CONN.

EST. 1849

THE MEAKER COMPANY

Manufacturers of Galvanizing Equipment and Electro Plating Machines

Est. 1899

Mechanical equipment will cut your plating cost and insure production. Good men are scarce. A machine is always on the job and ready to go.

Write for Illustrated Booklet on our Variable Speed Plating Machine.

1249 FULTON STREET **CHICAGO, ILL.**

Aero Brand

AEROIDS
Sodium Cyanide 96/98%
(½ ounce ball form)

COPPER CYANIDE
70/70½%

ZINC CYANIDE
55½%

SILVER CYANIDE
80½%

CADMIUM CYANIDE
65/66%

AMERICAN CYANAMID COMPANY
511 Fifth Avenue New York, N. Y.

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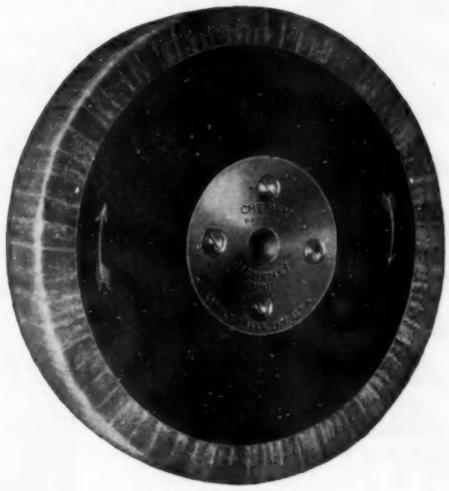
PRESSED LEATHER WHEEL CO.

MANUFACTURERS OF
Cheney Patent Metal Finishing Wheel
LITTLE FALLS, NEW YORK



Pat. Oct. 16, 1923.

The old reliable block wheel is usually covered with oak-tanned leather about ¼" in thickness. We can refill your old block wheels at a small cost with a full 2" cushion of this same oak-tanned leather. This makes a wheel that matches the block wheel in density and with the material on edge will cut faster and do twice the amount of pieces per setup, makes a beautiful coloring wheel and will last a lifetime.

(Built by Old-Time Polishers)

BRUSHES

Brass, Copper and Steel Wire Brushes
An assortment of
Machine and Circular Brushes
Chandelier Manufacturers', Silver and Nickelplaters' Brushes, Etc.
Repairs Promptly Attended to

H. BLUMENTHAL & CO., MFRS.
ANDREW H. LAU, Sole Proprietor
241-243-245 CENTRE ST., NEW YORK
Ask for Catalog "M"

KALYE

(Trade Mark)

FOR PREPARING METAL SURFACES FOR PLATING, &c.
SAMPLE CAN SENT FREE

Correspondence Solicited Mention This Journal

H. M. ANTHONY CO., Agent
261 Greenwich St., New York

REAL PROOF

Wolverine Bumper & Specialty Co.

INCORPORATED

MANUFACTURERS OF

HIGH GRADE OIL TEMPERED BUMPERS

GRAND RAPIDS, MICH.

October 27th, 1926

Hill-Curtis Co.,
Kalamazoo, Mich.

Please Ship Us

20 Victory Lathes
Tight and Loose Pulleys
Duplicating Machines
recently supplied us

$95.00 each
F. O. B. Kalamazoo

VICTORY has large Timken Bearings

The Wolverine folks are big people, making the high grade bumpers you see on Buick cars. They bought

1—VICTORY—then
3—VICTORYS—then
4—MORE—and now
20 more

and they know it's the best buy on the market.

$75.00 for Single Tight Pulley Machine
$95.00 for Tight and Loose Pulley Machine

HILL-CURTIS CO.

MAKERS OF
POLISHING AND GRINDING MACHINERY
FORMERLY MADE BY WEBSTER & PERKS TOOL CO., SPRINGFIELD, OHIO

KALAMAZOO MICHIGAN

H F & G

NICKEL	COPPER	CADMIUM
ANODES	ANODES (Cast, Rolled and Electro Dep.)	ANODES
SALTS	SULPHATE	OXIDE
CHLORIDE	CARBONATE	SULPHATE
FLUORIDE	CYANIDE	HYDRATE
CARBONATE		CHLORIDE

CHROMIC ACID, CHROMIUM SULPHATE, CHROMIUM CARBONATE

BRASS, BRONZE, TIN and ZINC ANODES

The Harshaw Fuller & Goodwin Co.

545 Hanna Bldg.
CLEVELAND

150 Nassau St.
New York

Jackson & Swanson Sts.
Philadelphia

107 No. Market St.
Chicago

XCEM PRODUCTS

Lead in the Industrial Cleaning Field

Our files contain the names of thousands of satisfied users who in many instances not only reduced their cleaning costs but also increased speed of production.

Is Your Name There?

You run no risk as our materials are always sold under a guarantee that affords the purchaser full protection.

If none of our numerous formulæ will meet your requirements; we will carefully study your problem at our expense and if necessary produce a formula that will be guaranteed to satisfy you.

We specialize on difficult cleansing problems to be of service.

MAGNUSON PRODUCTS CORPORATION

Main Office & Works
55 Third Street, Brooklyn, N. Y.

Chicago Warehouse
16 No. Wacker Drive

BRANCH OFFICES

Philadelphia, Pa.
5054 North 7th St.

Boston, Mass.
950 Park Sq. Bldg.

Chicago, Ill.
16 No. Market St.

The De Vilbiss Ball Burnishing and Grinding Barrel

MOTOR DRIVEN MACHINE

SOME years ago **THE DE VILBISS CO.**, a nationally known manufacturer of atomizing and spray painting equipment, were confronted with the serious problem of ball burnishing so many of their parts, many of which were of a most delicate nature.

None of the barrels on the market gave them satisfactory results, and this led to the development, in their own factory, of the **DE VILBISS BALL BURNISHING AND GRINDING BARREL.**

You will note from the cut that the barrels may be adjusted on the supporting trunnions at any angle.

The shape of the barrel imparts a peculiar motion to the pieces inside which are being finished. They are rolled or tumbled, not only from the end toward the center, but also rolled and tumbled in the same manner as in an ordinary tumbling barrel. This gives a double motion, which not only shortens the time in finishing, but polishes the work much more thoroughly.

By adjusting the barrel to an acute angle, as shown by position of the iron barrel, the movement of the work inside is made much more rapid, and when doing work of not too delicate a nature, the finishing process can be completed in a remarkably short time.

Both cuts indicate the machine equipped with a cast iron and with a wooden barrel. The iron barrel is used for grinding, and the wooden barrel for the burnishing process. These barrels are interchangeable, and the machine can be furnished as shown in cut or with both wooden or both iron barrels.

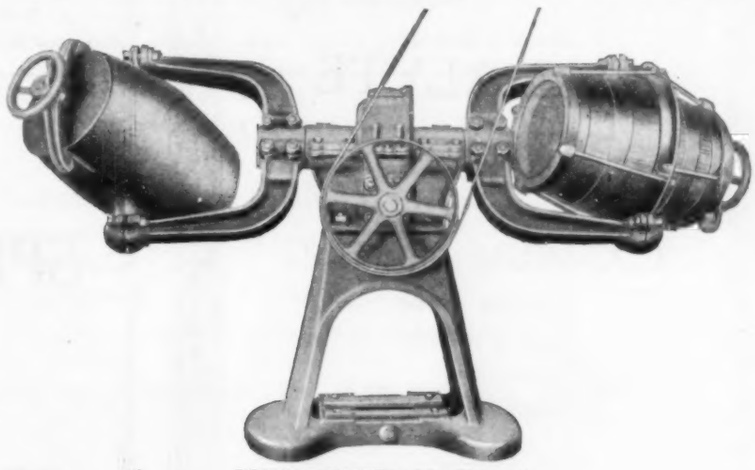
During the past two years the largest manufacturers of automobile hardware (name on request), located here in Detroit, have installed eleven of these machines, and their production from these machines is more than double the production previously obtained from any other type of barrel.

Capacity of iron barrel 1¼ bushels. Capacity of wooden barrel, 1 bushel.

The Motor Driven Machine is operated by a 1 HP Motor. Motors can be supplied for any current.

Overall dimensions—Height 3 ft. 9 in. Width 1 ft. 9 in. Length 5 ft. 7 in.

Shipping Weight—1200 lbs.



BELT DRIVEN MACHINE

FREDERIC B. STEVENS, INC.

INDIANA BRANCH:
Hoosier Supply Co.,
138 South Delaware Street,
Indianapolis, Ind.

NEW ENGLAND BRANCH:
Frederic B. Stevens, Inc.,
51 Chestnut Street,
New Haven, Conn.

Manufacturers of Foundry, Electro-Plating and Polishing Supplies and Equipment
Cupola Blocks, Fire Brick and Clay

Corner of Third and Larned Streets
DETROIT, MICH.

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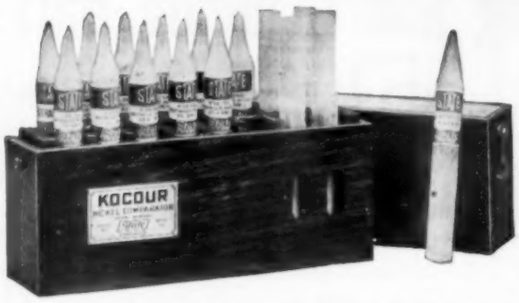

KOCOUR NICKEL COMPARATOR
PATENT PENDING

NICKEL

Accurately, simply and rapidly determined to the ¼ oz./gal. DIRECT READING—

—NON-FADING STANDARDS

PRICE $12.00 CHICAGO

Write for Literature!

MADE BY

PLATERS' SUPPLIES — *State* — POLISHERS' SUPPLIES

MANUFACTURING CO.

4041 S. KEDZIE AVE. CHICAGO

ESTABLISHED 1850

JOHN HASSALL, INC.

CLAY & OAKLAND STREETS
BROOKLYN, N. Y.

QUICK DELIVERIES

RIVETS
ESCUTCHEON PINS
SPECIAL WIRE NAILS
IN ALL METALS

CADALYTE

A
Process and Product
for

CADMIUM PLATING

Cadmium Anodes
Cyanide of Soda
Caustic Soda
Platers Chemicals

The Grasselli Chemical Co.
Established 1839

Sales Offices
NEW YORK - - - 347 Madison Ave.
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GRASSELLI GRADE
A Standard Held High for 87 Years

SPECIAL PRICES

5" 6" 7" 8"

SEWED BUFFS

HIGH QUALITY

25c PER POUND

We specialize in these sizes only

Send for samples or order with our guarantee of satisfaction

The Lea Manufacturing Co.
WATERBURY CONN.

You Can Purchase Felt Wheels at First Cost Per Pound Lower Than U. S. A. Brand

1896 1926

BUT

tabulate your total expense and you will find no other Felt Wheel will show as low a cost per wheel as this well known brand.

EASTERN'S STANDARD PRICES

Diameter	Thickness	Price per pound — Less than 100 lbs.	100 to 200 lbs.	Over 200 lbs.
10 to 16″	1 to 3″	$3.00	$2.75	$2.65
6 to 8 & over 16″	1 to 3″	3.10	2.85	2.75
6 to 24″	over 3″	3.40	3.15	3.05
6 to 24″	½ to 1″	4.00	3.75	3.65
6 to 24″	under ½″	4.25	4.00	3.90
4 to 6″	¼ to 3″	4.85	any quantity.	
under 4″	¼ to 3″	5.45		

Special prices on wheels with large holes, with or without centers countersunk to sketch.

SHEET FELTS

Medium and Fine Quality

Standard sheets .....36 x 36
Standard thickness .....½ to 3⅛
Standard hardness .....five degrees

Other sizes made up as ordered either in square or oblong sheets

AGAIN total costs are reduced by the extra wearing qualities of this Felt.

EASTERN FELT COMPANY

Manufacturers

Office: 10 High St., BOSTON, MASS. *Factory:* WINCHESTER, MASS.

ACCURACY

Modern machine shop equipment is all directed towards speed and the finest accuracy in dimensions.

Concurrently with this greater accuracy, scales, calipers, and micrometers weighing and measuring to the finest point check every step of production.

Supplementing these modern aids to fine work, the

Wyandotte
Clean "Chemically" Clean
Metal Cleaners

by insuring "chemically clean" metal on a par with high speed production work, have reduced metal cleaning operations to a basis of dependable and uniform results.

Moreover, these results are obtained in thousands of metal production plants at no increased cleaning cost.

Ask your supply man for "WYANDOTTE"

THE J. B. FORD CO.
Sole Manufacturers
WYANDOTTE, MICHIGAN

Having trouble with Plating?

DOES your plate blister or peel off? Is it uneven or irregular? Does it leave pin-holes and exposed spots that invite rapid corrosion?

If so, perhaps your cleaning is at fault.

Call in one of our Service Men. Let him work with you in getting things running smoothly again. For with Oakite Platers' Cleaner you can secure a chemically clean base metal, quickly and at low cost. It does not give off noxious fumes, and is simply and easily used under all shop conditions.

Get in touch with us today; or write for booklet. No obligation.

Oakite Service Men, cleaning specialists, are located at:

Albany, Allentown, Pa., *Atlanta, Ga., Baltimore, *Boston, Bridgeport, *Brooklyn, Buffalo, Camden, Charlotte, N. C., *Chicago, *Cincinnati, *Cleveland, *Columbus, O., *Dallas, *Davenport, *Dayton, *Denver, *Des Moines, *Detroit, Erie, Flint, Mich., Fresno, Cal., *Grand Rapids, Harrisburg, Hartford, *Indianapolis, Jacksonville, Fla., *Kansas City, Los Angeles, Louisville, Ky., *Milwaukee, *Minneapolis, *Montreal, Newark, Newburg, N. Y., New Haven, *New York, *Oakland, Calif., *Omaha, Neb., Philadelphia, *Pittsburg, Portland, Me., *Portland, Ore., Providence, Reading, *Rochester, Rockford, Rock Island, *San Francisco, *Seattle, *St. Louis, South Bend, Ind., Springfield, Ill., Syracuse, *Toledo, *Toronto, *Tulsa, Okla., Utica, *Vancouver, B. C., Williamsport, Pa., Worcester.

*Stocks of Oakite materials are carried in these cities.

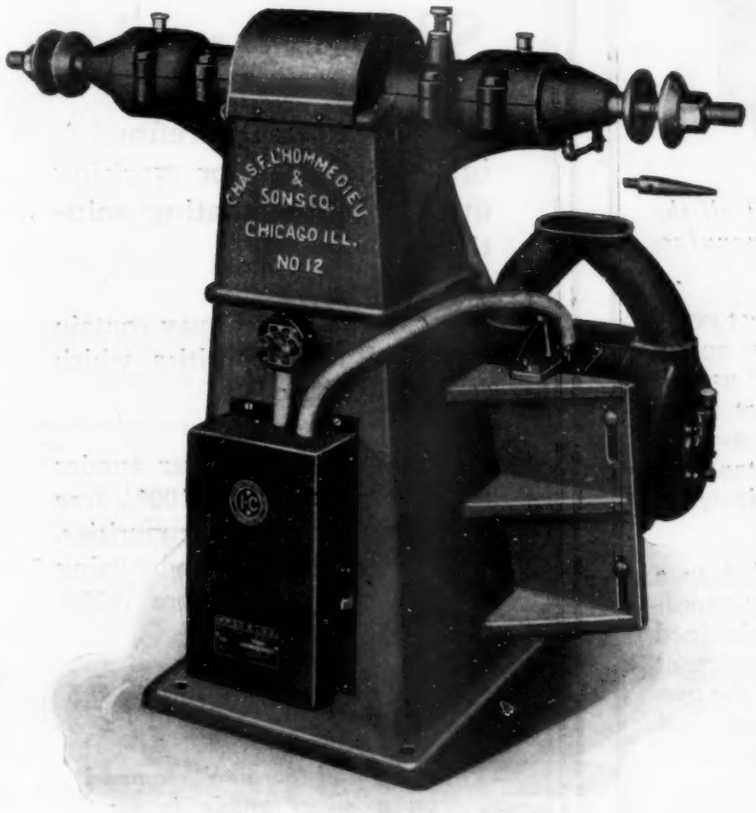
OAKITE
TRADE MARK REG. U.S. PAT. OFF.
Industrial Cleaning Materials and Methods
OAKITE IS MANUFACTURED BY OAKITE PRODUCTS, INC.
formerly OAKLEY CHEMICAL CO. 18 THAMES ST., NEW YORK, N.Y.

GET THE SPEED YOU WANT

WITH ALTERNATING CURRENT

Here is your opportunity to eliminate wasteful line shafting and still have the desired speed. Don't be satisfied with 1800 or 3600 R. P. M. when our No. 12

Reliance Combination Motor Lathe



BUILT FOR HEAVY DUTY

Gives you any speed from 1200 to 3600 R. P. M. The lathe is belt driven from the motor, and the speed is changed simply by changing size of motor pulley. A hinged hood furnishes full protection against belt and pulley, at the same time leaving them easily accessible. The belt is tightened by vertical adjustment of the motor.

The motor is completely enclosed, insuring continuous operation. It is air cooled, the ventilation being supplied by the special construction of the motor itself.

Both Motor and Lathe are ball bearing.

Furnished complete with starting switch with push button control.

Standard sizes—3 and 5 H. P., 3-phase, 60 cycles, 220 or 440 volts.

Dimensions

Size of base of lathe, 19x20 inches.

Height from base to center of spindle, 38 in.

Diameter of spindle between flanges, 1¼ inches or 1 inch.

Diameter of spindle in races, 1½ inches.

Length of spindle, 50 inches.

Size of pulleys, 5 inch diameter, 5 inch face.

Crucible steel shafting.

Shipping weight, complete, 874 lbs.

Same High Standard of Quality as RELIANCE BELT-DRIVEN LATHES

CHAS. F. L'HOMMEDIEU & SONS CO.

Manufacturers of Platers' and Polishers' Supplies

Office and Factory
4521 Ogden Avenue
Phones: Lawndale 3992

CHICAGO, ILL.

Salesroom
26 South Clinton Street
Phones: Franklin 3508-1022

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Cleveland, Ohio

Reynolds-Robson Supply Co.
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Geo. W. Kyle & Co.
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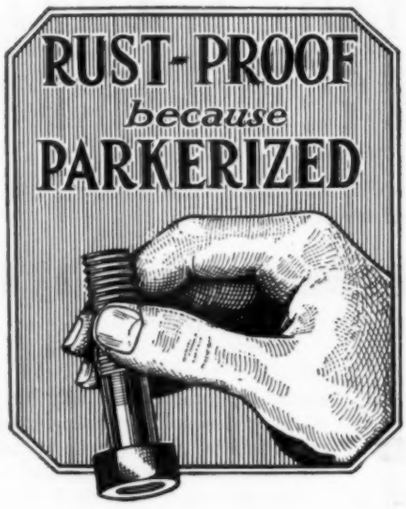
Chas. F. L'Hommedieu & Sons Co.
Atwill & Hussander, Agts.
2424 McPherson St., Los Angeles, Calif.



"—and you say we can rust-proof all the iron and steel parts used in the manufacture of our products?"

You certainly can. You can protect every bolt, nut, spring or hinge against corrosion. You can increase the life of usefulness of any iron or steel product for a fraction of its cost. You can rust-proof these parts so that they will withstand the elements and drenching rains without a sign of rust.

PARCO POWDER, when added to a tank of boiling water, forms a rust-proofing solution which produces a Parkerized surface. It is an economical treatment which changes the composition of the surface of the metal and renders it rust-proof without changing its physical attributes in any way.

Parkerizing makes it possible, in many instances, to use iron or steel as a substitute for brass, aluminum and other more expensive metals. It makes a perfect base for paint and enamel and prevents peeling, cracking and rusting underneath when exposed to the elements.

Our publication *"The Parkerizer"* will be mailed to any manufacturer or industrial executive upon request—likewise our book *"Parker Rust-Proofing Process,"* which treats the rust-proof problem fully, is yours for the asking.

PARKER RUST-PROOF COMPANY
2176 Milwaukee Ave., East Detroit, U. S. A.

HANDY & HARMAN .999+ FINE QUALITY SERVICE

Every ounce of silver in Handy & Harman

Silver Anodes

has been specially refined to insure its superior working quality in the plating solution.

Silver not so refined may contain traces of the impurities which cause Black Anodes.

Handy & Harman silver anodes are guaranteed to be 100% free from trouble making impurities. Save money and trouble by using these anodes. They are .999+ fine.

"Handy and Harman" stamped on a silver anode is an absolute assurance.

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General Offices
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Plants
Bridgeport, Conn. **Fulton & Gold Sts., New York**

THE BIAS BUFF

ONLY 1

THERE IS ONLY ONE BUFF THAT CAN'T WASTE

Threads can't pull out of Bias Buffs

Threads pull out of any other buff

WRITE FOR A WHEEL FOR TRIAL

The Bias Buff and Wheel Co., Inc.
342 Madison Ave., New York City

Soliciting Contracts for Year 1927

Copper Carbonate 53/55%

Especially manufactured for electro plating

Agents for John C. Wiarda & Co., Inc.

CHARLES HARDY, Inc.

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CLEN ESCO

No Tarnish—No Corrosion

Yet Thoroughly Cleaned

MAYBE you think you've tried all the different cleaning compounds (that is, really different, other than in name) and have settled on the one that seems to come nearest to cleaning your work properly.

Now try Clen-Esco. It's a basically different cleaner, chemically and physically. Its composition is patented. Used in hot solution.

Clen-Esco cleans polished brass and aluminum without tarnish or corrosion, because its alkali is under colloidal control. This same colloidal action greatly speeds up the cleaning process.

Let us tell you more about it. Other manufacturers are getting splendid results with this new scientifically developed metal cleaner.

THE COWLES DETERGENT COMPANY
558 Commonwealth Building
Euclid Ave. and E. 102nd St., Cleveland, Ohio

Cleans Thoroughly
Saves Time & Labor

The Cowles Detergent Company
558 Commonwealth Bldg., Euclid Ave. and E. 102nd St.
Cleveland, Ohio

Send information about Clen-Esco.

We want to clean.....

Firm .....

Individual .....

Town and State.....

SEYMOUR PRODUCTS

HIGHEST QUALITY

NICKEL ANODES

ROLLED OR CAST IN ALL COMMERCIAL
SIZES, SHAPES AND PERCENTAGES
BRASS, BRONZE AND COPPER ANODES

THE SEYMOUR MANUFACTURING CO.

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Established 1878

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Western Distributors: Crown Rheostat & Supply Co., Chicago, Ill.

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A New Brass Lacquer

Samples and service will go forward to you on receipt of your inquiry.

A New Silver Lacquer

Products of the highest quality manufactured by an organization which takes pride in their manufacture.

Anderson Chemical Company

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Division of Merrimac Chemical Co.

"Built for Service"

THE NEW

Economy No. 11 Air Sprayer

This sprayer can be used either with Jar or bucket. Its connections are made for either. The cap on Jar is made from Aluminum.

Price - - - $10.

SIMPLE PRACTICAL
DURABLE ECONOMICAL

Applies paint, varnish, lacquer, enamel, bronzes, etc., at low pressure. Standard jar is used.

Circulars on request

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SOLD BY ALL LEADING DEALERS.

BARREL PLATING

NICKEL · COPPER · BRASS

Hot and Cold Galvanizing
BRIGHT DIPPING AND OXIDIZING

We Solicit Your Inquiries on the Above Finishes

CONTRACT PLATING CO.

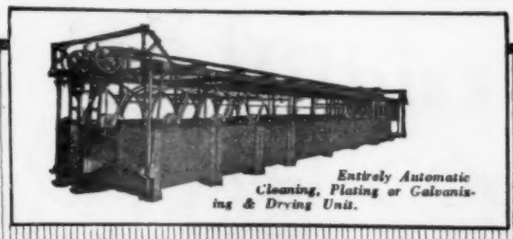
36 RIVER STREET BRIDGEPORT, CONN.

See Text Page 514

for information regarding

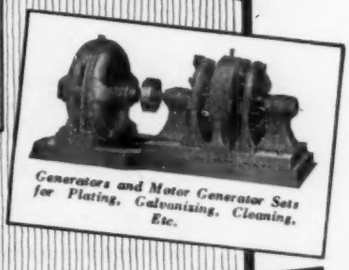
The International Fellowship Club

MEETING AND LUNCHEON



Entirely Automatic Cleaning, Plating or Galvanising & Drying Unit.

Rotary Cleaner, Pickle, Acid Dip, Neutraliser, Rinse & Drying Unit.

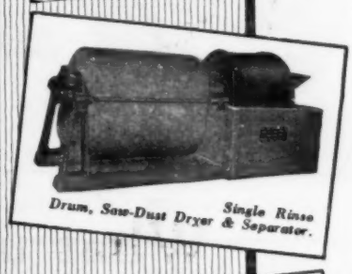


Generators and Motor Generator Sets for Plating, Galvanising, Cleaning, Etc.

Moving Cathode Plating or Galvanising Unit.

Rotary Saw-Dust Dryer & Separator.

Automatic Conveyer Dryer.



Drum, Saw-Dust Dryer & Separator. Single Rinse

EQUIPMENT FOR
PLATING
ELECTRO-GALVANIZING
CLEANING
PICKLING
ACID-DIPPING
NEUTRALIZING
RINSING
DRYING AND
ALLIED OPERATIONS

ENTIRELY AUTOMATIC
SEMI-AUTOMATIC
HAND-OPERATED

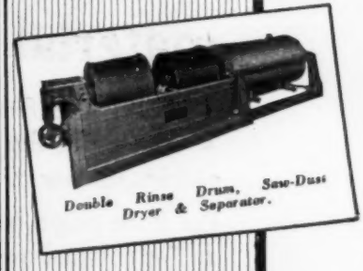
GENERATORS
MOTOR-GENERATOR SETS

Single Units *Complete Plants*

U. S. Galvanizing & Plating Equipment Corporation
32 Stockton Street Brooklyn, N.Y.

Manufacturers
Incorporated 1896

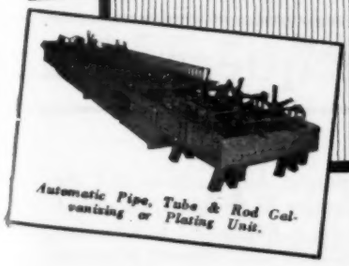
Self-Emptying Plating Barrel.



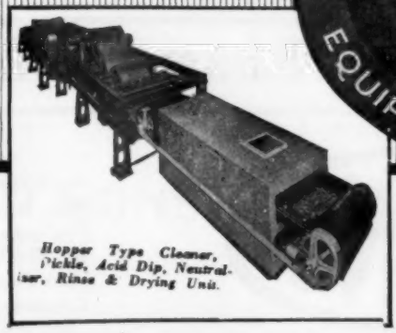
Double Rinse Drum, Saw-Dust Dryer & Separator.

Alternate Rotating Plating Barrel.

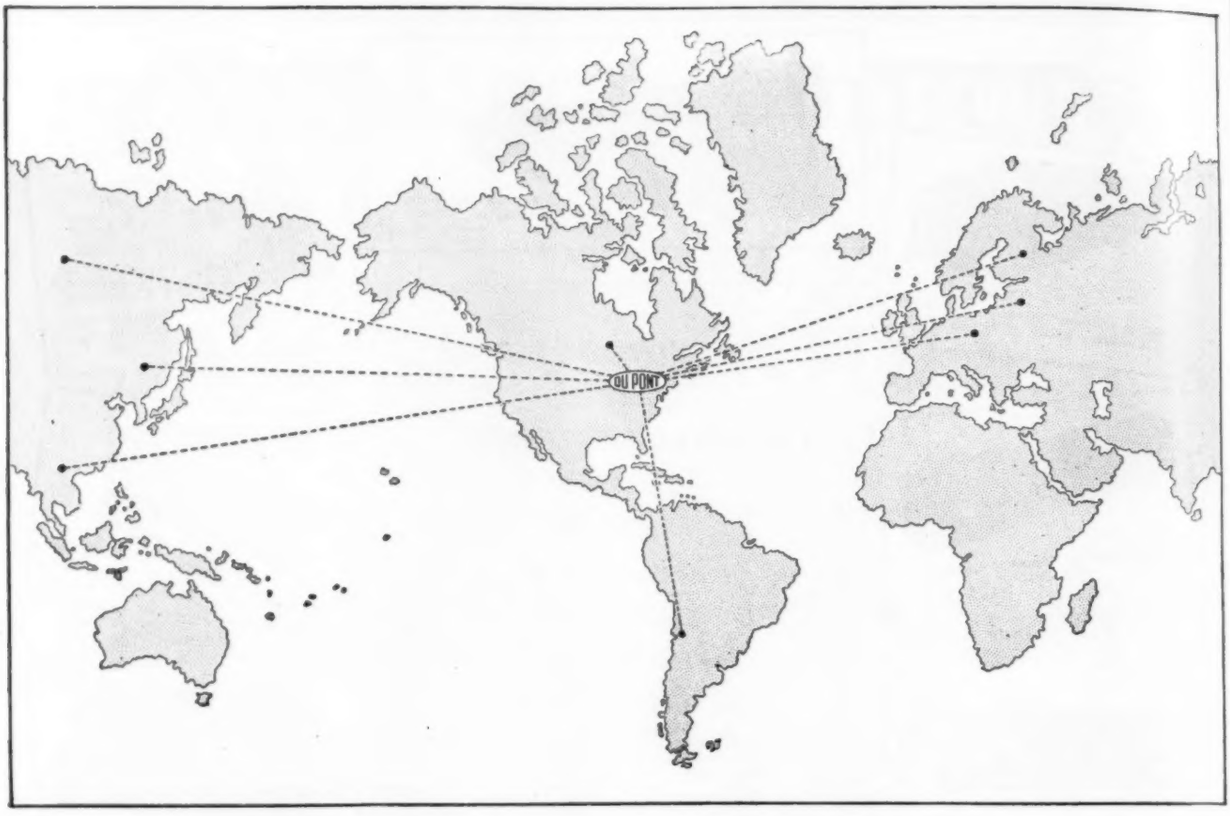
U.S. GALVANIZING & PLATING
US
EQUIPMENT CORPORATION



Automatic Pipe, Tube & Rod Galvanising or Plating Unit.



Hopper Type Cleaner, Pickle, Acid Dip, Neutraliser, Rinse & Drying Unit.



What uniform control from raw material to finished product means

FROM the farthermost parts of the world the du Pont Company gathers its raw materials.

Du Pont ships bring nitrates from du Pont owned mines in Chile. From Asia come du Pont basic gums and from Europe come du Pont fusel oils.

Du Pont forests in Michigan furnish the materials from which acetic acid is made.

Cotton from the South is purified and processed in the du Pont Company's own plant.

Finally, the unified manufacturing and chemical surveillance *through every process* makes du Pont finishes capable of meeting the most rigid uniformity tests.

Such uniform control from raw materials to finished product assures you of *maintained high quality.*

Paints, Varnishes, Enamels, Lacquers, Duco

DU PONT

For further details simply address E. I. du Pont de Nemours & Co., Inc., Chemical Products Division, Parlin, N. J., Chicago, Ill., San Francisco, Cal., Everett, Mass., or Flint Paint and Varnish Limited, Toronto, Canada.

DeVilbiss

Small — Handy
Invaluable

Type C Spray Gun

for (1) stenciling, decorating, high-lighting, blending or shading furniture, lighting fixtures and art objects; (2) coating small parts individually; (3) touch-up work of every description; (4) applying materials on any kind of surface; (5) working to an exceptional degree of fineness and accuracy.

The DeVilbiss Type C Spray Gun, with 6-oz. glass container—or metal if preferred, is one of the handiest tools you can have in the finishing room. . . . The Gun fits the hand; the forefinger falls naturally on the trigger; a gentle varying pressure on the trigger produces a spray ranging from the most delicate and finest to the widest used for average coating. . . . Type C Gun is simple in construction, easy to clean, and embodies many of the basic advantageous features of the widely known and used DeVilbiss Type A Spray Gun.

The glass container has a label section sand-blasted on the side on which to write color specifications. Extra containers and a light, convenient tray for holding and carrying them are supplied.

Let us tell you more about the Gun and the complete outfit.

DeVilbiss
Spray-finishing System
Complete Spraying Equipment

THE DeVILBISS COMPANY 266 Phillips Ave. TOLEDO, OHIO
New York—Chicago—Detroit—San Francisco—Cleveland
Indianapolis—St. Louis—Milwaukee—Minneapolis, Windsor, Ontario

TRADE PIONEER MARK

The Finish Beautiful

TALK YOUR HEAD OFF

WHO CARES?

TRADE PIONEER MARK

WE can stand here and talk all year but nothing will be gained except if you take a stick and polish up a piece. Our Pioneer Green Chromium Crocus is only known and remembered by the finish it produces on the Chromium Plate.

This Crocus is now being successfully used and recommended by the largest manufacturers of Chromium finished products. Pioneer Green Chromium Crocus is made by the hand rolled process, which is one of the reasons for its producing the highest black mirror finish at the least cost of time and labor.

ZUCKER SONS COMPANY, Inc.
228 BROADWAY ELIZABETH, N. J.

LACQUERS
AND
LACQUER ENAMELS

M&W Co. 1876

CRACKLE ENAMEL
BLACK WHITE
and
ALL COLORS

Can be used over our regular line enamels

MAAS & WALDSTEIN CO.
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WORKS, NEWARK, N.J. NEW YORK
CHICAGO OFFICE AND WAREHOUSE
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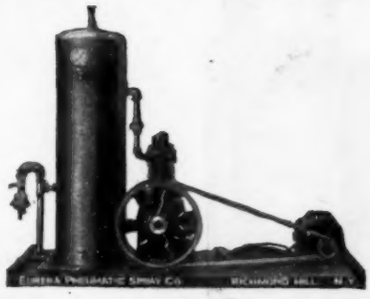
"EUREKA"
Insures an Honest Deal and the
BEST OF EVERYTHING



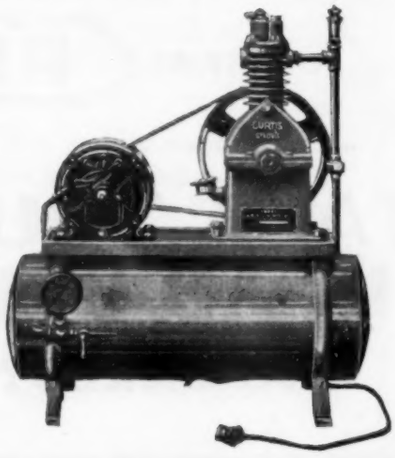
74.00 CURTIS AIR 74.00

Compressor Size 2⅛" x 2½", 10" x 30" Air Tank, Gauge, Safety Valve, Drain, 1/3 H.P. Motor, Belt, Electric Cord and Plug. Exactly as shown. Twice the capacity of other makes.

Also Everything in the Air—Compressor, Sprayer and Exhaust Lines

EUREKA PNEUMATIC SPRAY CO.
8728 130th St., Richmond Hill, L. I., New York

Improved "Ideal" Pony Outfit



A Complete Air Compressor Unit for $75

This compact, efficient and foolproof outfit, complete as illustrated, is designed for continuous operation and is unconditionally guaranteed for one year of constant service. Equipped with automatic electric stop and start for $20 additional.

There is an "IDEAL" Air Brush for every purpose. Send for our catalogue.

THE IDEAL AIR BRUSH MFG. CO.
203-205 Lafayette Street New York

Since 1884

ZAPON

LACQUERS & LACQUER ENAMELS

The Recognized Standard

Absolute Clarity

IN the production of fine finishes it is essential that the finishing material be free from any foreign substance.

Zapon Lacquers are filtered three times. First, the nitro-cellulose solution is clarified; then the gum solution and, lastly, the finished product. Each filter unit, consisting of two folds of filter cloth and one of laboratory filter paper, is used for not more than ten gallons of any one solution.

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ZAPON
REG. U.S. PAT. OFF.

The pioneer lacquer finish

Lacquers

PLC

All our lacquers are especially made to meet the requirements of the organization purchasing them. We do not attempt to urge organizations to standardize on a stock grade which we may have on hand.

STAFF of EXPERTS

A trained staff of experts with a fully equipped laboratory is at your demand.

PITTSBURGH LACQUER & CHEMICAL CO.

Office
Farmers Bank Bldg.
Pittsburgh, Pa.

Plant
Cheswick
Pa.

APPEARANCE

PRODUCT appearance is in most cases purely a matter of finish. Take two of your own in their crude state. Finish one up carefully with a good lacquer or enamel like ALAKA, and the other just slip-shod fashion with any old lacquer. Put them both on the market and see which of the two sells quicker. See which of the two gets the preference.

In spite of the fact that the products underneath the finish are identical in appearance, in quality, in performance, the ALAKA finished product will come out on top all the time.

You can't talk quality when the eye sees shoddy. You can't economize on the finish and pocket the difference.

We request the opportunity of demonstrating our ALAKA finish on your product under typical conditions in your finishing room.

Have you a copy of our new booklet "Finishing Facts"?

ALAKA *The Practical Lacquer*
LACQUER & CHEMICAL CORPORATION

214-224 Fortieth St., Brooklyn, N. Y.

Finished with—

Bronze Coating-NP BREVOLITE

Cut loaned through courtesy of Sargent & Company, manufacturers of hardware, New Haven, Connecticut.

The name shown on the Door Closer in the above cut is sufficient endorsement of Bronze Coating to stamp it as a product of merit.

BRONZE COATING is a medium for applying Bronze Powder, producing a durable, tenacious finish of smooth satin appearance, in one coat.

Samples and further information will be gladly furnished on request.

Waukegan Chemical Company

"Values that endure"

WAUKEGAN **ILLINOIS**

This Decorative Finish Adds Sales Value

The Hilo Crystallizing Lacquer finish imparts a richness and beauty to products that is distinctively attractive.

This finish can be brushed or sprayed on any hard, non-porous surface and over any other finish—colored enamel, lacquer, japan, varnish.

Colors, decorative transfers, trade marks, stencilled designs—all show effectively thru the clear lacquer.

Hilo Crystallizing Lacquer lowers production costs. Fewer undercoats are required because this finish hides minor imperfections in the surface.

Hilo Crystallizing Lacquer has enhanced the appearance and increased the sale of many products. Try it on yours.

Send for working sample and Bulletin No. 8

HILO VARNISH CORPORATION
(Moller & Schumann Co.)

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HILO
Hilo Crystallizing Lacquer

LACQUER IT WITH ZELLAC

ZELLAC

Zellac *coverage* means Economy in your production—

—whether you use Zeller lacquers or Zeller lacquer-enamels—in either the *spray* or *dip* or *brush* grades.

Metal product manufacturers using Zellac *know,* with complete satisfaction, that savings due to *the unparalleled covering qualities* of Zellac can be definitely figured in Production Dollars, which are just as big as Sales Dollars.

This is not a "new" fact! It was the power of Zellac to *cover* the job that helped establish the Zeller tradition of two generations ago. And Zeller standards are at your service today—for the asking.

ZELLER LACQUER MFG. CO.
ZELLER BUILDING
20 East 49th St. New York

Stock Rooms and Offices at:
Chicago: 551 West Lake Street
Los Angeles: 786 Ceres Avenue
San Francisco: 67 Steuart Street
Denver: Ormor Sales & Supply Co., 1428 Court Pl., Distributors.

ZELLAC

ZELLAC

Nikolas Lacquers

ARE

THE STANDARD OF THE WORLD

— If you doubt it, give them a trial.

Thirty years of uninterrupted success is our best reference.

We recommend:

C. E. 5 LACQUER
For Lighting Fixtures, etc.

D. G. LACQUER
For Fine Builders & Cabinet Hardware

PORCELEEN LACQUER
A water white lacquer for many finishes

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A Fine Imitation Bower Barff Finish for Optical and Scientific Instruments, etc.

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WHITE ENAMELS
For Bath Room and Lighting Fixtures.

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For Pencils, Dolls, Artificial Limbs and Polychrome Finishes, etc.

BRONZING LIQUID "B"
A Wonderful Bronze Powder Medium.

BRONZE POWDERS
All Kinds.

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THE NIKOLAS SPRAYER

Over 5,000 in use. No sprayer on the market at any price is better constructed or more efficient. Price $10.00. With agitator for bronze powder mixtures $11.00. We can furnish compressors, exhaust fans, air tanks, motors, hoods, etc.

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Compress Walrus

Leather Covered Wood Wheel
48" dia. 1¼" face

Compress Canvas

Compress Felt

Bull Neck Leather

Polishing and Buffing Wheels for Every Purpose

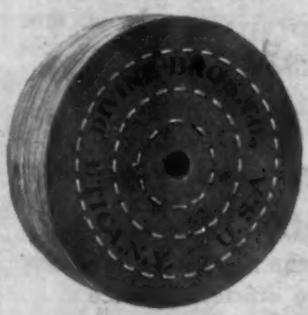
This page gives you an idea of the great variety of Flexible Grinding, Polishing and Buffing Wheels manufactured by us.

You cannot discover a need in such wheels that we cannot fill. Many manufacturers pass their Polishing and Buffing problems on to us as a matter of routine. They rely on our 30 years experience.

You are invited to do the same. You'll find us anxious and able to serve you, and—what is important from your standpoint—READY to serve.

Divine Brothers Company
Utica, N.Y.

Disc Canvas
(Cemented)



Sheepskin (Hand Sewed)

Solid Spanish Felt

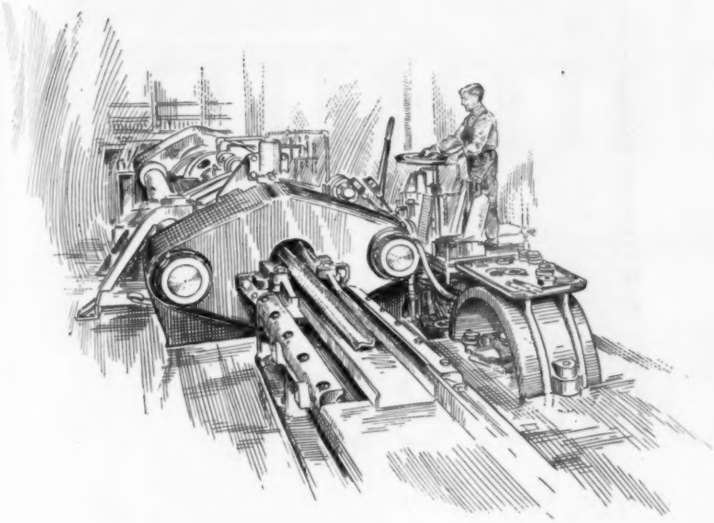
Leather Covered Wood Wheel

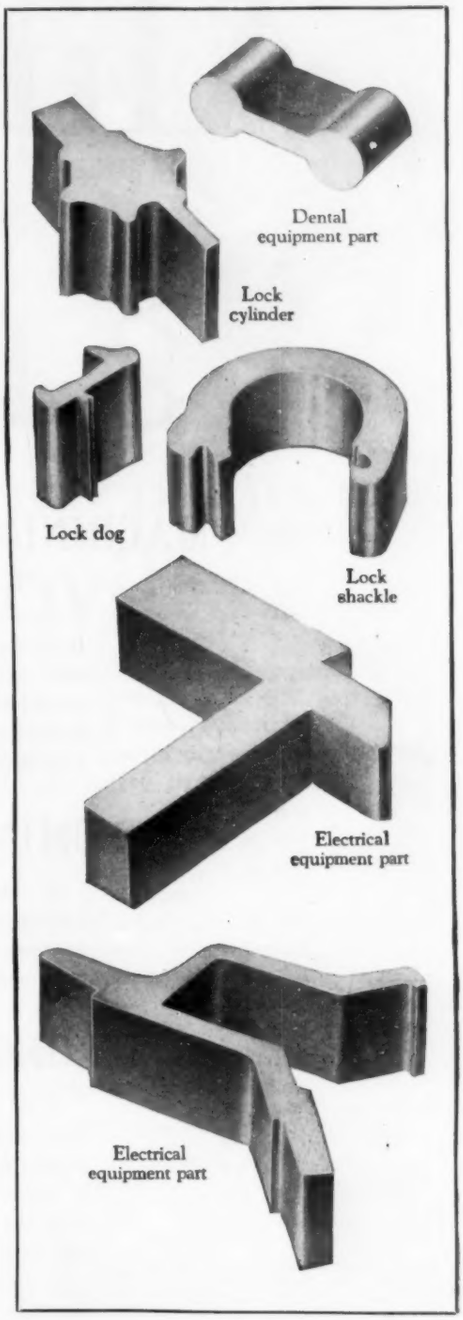
Full Disk Buffing Wheel (Loose)

Sewed Pieced Buffing Wheel

Clothflex Polishing Wheel

ANACONDA EXTRUDED SHAPES





Clean-cut and Strong

ANACONDA Extruded Shapes of brass, bronze or copper, are uniform in cross section, with sharp, clean-cut lines. They have smooth, fine grained surfaces, and are free from defects common in sand castings.

The combination of accurate detail, smooth finish and great strength, at least 50,000 pounds per square inch, makes Anaconda Extruded Shapes adaptable to many exacting requirements. The illustrations show typical parts extruded for leading mechanical and electrical manufacturers.

When writing for quotations please send blue prints, with complete information regarding quantities, etc.

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GENERAL OFFICES: WATERBURY, CONNECTICUT
Offices and Agencies in Principal Cities
Canadian Mill: ANACONDA AMERICAN BRASS LTD., New Toronto, Ont.

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3 booklets

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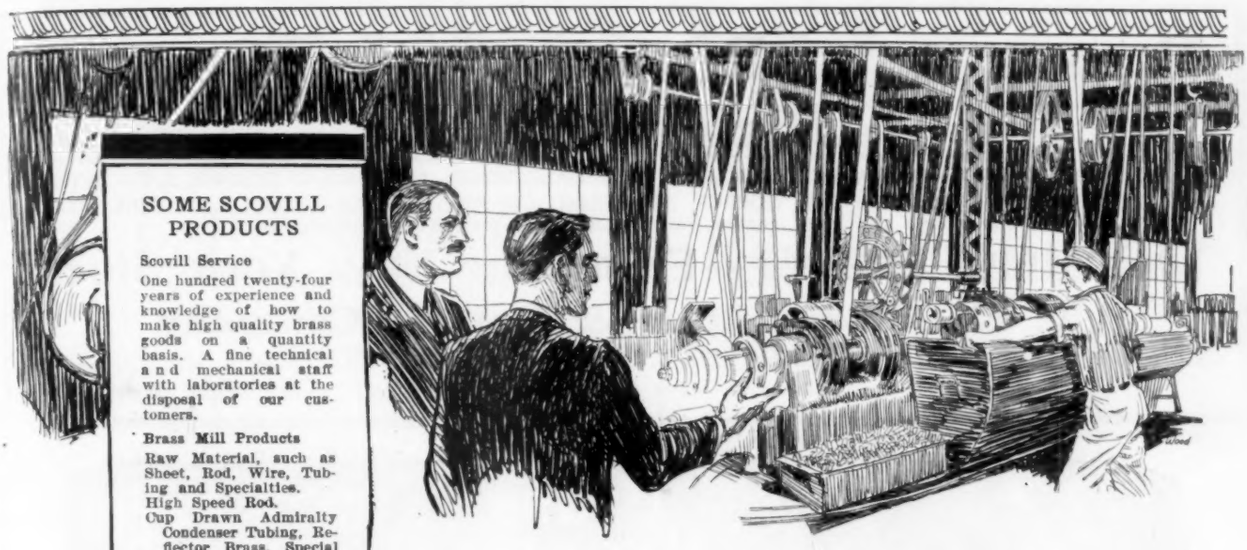
Aluminum Company of America

2301 Oliver Bldg., Pittsburgh, Penna.



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One hundred twenty-four years of experience and knowledge of how to make high quality brass goods on a quantity basis. A fine technical and mechanical staff with laboratories at the disposal of our customers.

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Raw Material, such as Sheet, Rod, Wire, Tubing and Specialties.
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Uniform Buttons.
Tack Fastened Buttons and Machinery for attaching.
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We make to order

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THE AMERICAN PIN CO. DIV.

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Electric Fixture Parts.

OAKVILLE-AMERICAN PIN DIV.

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Bank Pins.
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Every 4 weeks SCOVILL will feature a product or special department ON THIS PAGE

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Brass :-: Bronze :-: Copper

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Member, Copper and Brass Research Association

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INCORPORATED
SHEET AND BAR COPPER
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Stampings, Lock Seam Tubing made in Brass, Copper, Steel and Zinc
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WHITE BRONZE INGOT
Melts like brass. Stays white. Sample on request.
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We sell Mond Nickel Fines Pellets

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For further particulars address THE METAL INDUSTRY, 99 John Street, New York City.

Inquiry No. 3440—Wish you would please advise us where we can purchase cold rolled aluminum in bars 5/16" thick and 1¼" wide.

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Inquiry No. 3442—Can you suggest a suitable layout and the necessary equipment for storing crude oil and means of supplying it to an oil burning tilting crucible furnace?

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Inquiry No. 3444—Will you kindly put us in touch with makers of hot galvanizing equipment?

Inquiry No. 3445—Will you kindly advise me where I can buy galvanizing equipment?

Inquiry No. 3446—We are trying to locate a source where we can buy nickel silver in sheets.

Inquiry No. 3447—Kindly advise of any machine for cleaning ashes by water.

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2—300 ampere, 6 volt, 900 R.P.M. Reliance generators complete with pulleys, sliding rails for belt tightening. Price each f.o.b. cars Cleveland, $190.00 net.

Above generators will have rewound armatures, new field coils, new bearings, new copper graphite brushes and new box type brushholders. For all practical purposes they will be equal to new machines. Mechanical and electrical condition guaranteed. Wire your order.

OTHER BARGAINS

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600	6	1300	Z. L. & L.
750	6	1100	Bennett O'Connell
800	7	800	Reliance
1000	6	1000	Ideal
1250/625	6/12	950	Hanson & VanWinkle
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4000/2000	6/12	690	Munning Optimus

Every machine offered is completely and thoroly overhauled and tested under full load before shipment. Electrical and mechanical condition guaranteed. We can construct any machine listed into motor generator set. Over 8000 motors in stock. Write for bulletin.

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Second-Hand Generators at Low Prices

AMP.	WATTS	MAKE	VOLTS	SPEED	BRUSHES
150	....	Bennett & O'C	5-6	1700	Gauze
200	....	U. S. Galvanizing	12	1150	"
200	1000	H & V'Winkle	5	1500	"
200	1200	" " "	6	1350	"
280	....	Zucker L & Loeb	6	1375	"
300	....	Reliance	5-6	1200	"
600	....	Dow Chemical	6	1300	"
750	....	Zucker L & Loeb	6	950	Composition
750	....	Bennett & O'C	6	1250	Gauze
750	....	Reliance	5-6	1075	Composition
1000	....	Holtzer Cabot	6	850	Gauze
300	600 Amps.	Hanson & V W.	6-12	1200	"
800	4000	" " "	6-12	1250	"
800	4000	" " "	6-12	1300	"
1000	....	Bennett & O'C	6	1100	Composition

Direct Connected to a 10 H.P., 3-Phase, 60-Cycle, 220-Volt Motor.

We also have second-hand motors, and Polishing Lathes. Write if in need of above equipment.

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Manufacturers' Plating and Polishing Supplies
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Polishing and Plating Equipment

Plating Dynamos and Motor Generator Sets

All sizes carried in stock.

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Anodes	Wheels and Buffs	Steam Boilers	Kane and Ofeldt
Spraying Systems	Ammeters		
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And most anything for the Plating Shop.

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Telephone Stagg 5128.

Largest Stock of Used Polishing and Plating Supplies in America

Let us have your requirements. Entire plants or parts thereof bought for cash. Send list with prices.

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WE WANT TO BUY

One Used Magnetic Separator for removing iron from zinc dust. Used Hot Galvanizing Equipment for Job Work.

G. C.,
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FOR SALE—Fifty tons Round Hot Forging Brass Rod, mill lengths .378 diameter. Very reasonably priced.

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Rolling Mill, 8 x 8 rolls—Lapointe Broach—Exhaust and pressure Blowers—Sand Blast—Plating Tanks—Percussion Press—Draw Bencher.

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Everything for Polishing and Plating Shops

Ammeters, anodes, buffs, dynamos, grinding lathes, motors, polishing lathes, rheostats, tanks, voltmeters.
Everything that is used in polishing, plating and lacquering rooms.
Plants bought anywhere in United States or Canada.
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FOR SALE—Six No. 8 Hanson & Van Winkle rebuilt polishing lathes with countershaft. Prices very reasonable.

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FOR SALE

36" Double burnishing barrel.	2 250 gal. cypress tanks.
1 Webster & Perks polishing lathe.	1 250 gal. 3 bbl. plating tank.
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FOR SALE—One No. 2 World Dynamo, 5 volts, 300 amperes. One tumbling barrel with nickel anodes. One polishing lathe. All of this equipment is guaranteed.

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Hammering Machine

WANTED—A used swedging or hammering machine.

Kafelt Manufacturing Company,
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We can save you money by remaking your worn down sewed and loose buffs. We are specialists in this line. Write for particulars.

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WANTED—No. 1 or No. 2 second-hand Baird Burnishing Barrels, single or double. Prices right.

J. GABARINO & Co.,
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WANTED—PLATING ROOM SCRAP. We buy nickel deposited brass and copper hooks, racks and baskets; also nickel peelings and strippings.

We also buy surplus stocks of sheet aluminum, brass and copper, also tubing.

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WANTED—A man thoroughly experienced in every phase of the polishing and buffing industry to fill a position as travelling salesman with a large manufacturer of polishing and buffing equipment. The man we require must have a practical knowledge of wheels, machines and supplies, and must be skilled in all operations pertaining to the polishing department. He should have had broad experience as a foreman in this industry. Applications for this position must stage age, whether married or single, and give a complete outline of experience, names of firms worked for, position filled with each, duration of employment with each, and references.

Traveling Salesman
care, THE METAL INDUSTRY

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Old-established New York City concern requires working foreman who can effectively handle help; must be thoroughly experienced in the preparation, plating (mechanical and still) and finishing in all branches of the plating business; particularly nickel, brass, copper, zinc, etc. In reply state fully experience, past connections, age, salary expected, etc.

K. T.
Care THE METAL INDUSTRY

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SITUATION OPEN—Manufacturers of Lacquer, Lacquer Enamels and old type finishes have a profitable opportunity for an experienced Salesman with some following in this field. Salary and commission basis. Replies treated confidentially.

LACQUER SALESMAN,
Care THE METAL INDUSTRY.

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SITUATION OPEN — Plater familiar with tin plating of snap fasteners, also black lacquering of snap fasteners. Only those familiar with hot immersion tin process need apply. Steady position. Address

TIN PLATER,
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PLATER

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SITUATION OPEN—By large hardware manufacturing concern a young man familiar with metal finishes. Preferably a college graduate with plating experience.

METAL FINISHER
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If you are looking for a good man to fill an important job, you will find one by using this space.

(Inquiries and Opportunities will be found on page 70)

BUSINESS WANTS—Continued

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Display Advertisements, One Column Wide, $1 per inch, Each Insertion, Payable in Advance

Metallurgical Chemist and Engineer

SITUATION WANTED—Ten years' research and technical control in production, metallurgy, fabrication, electroplating and finishing of steel and non-ferrous metals and alloys, including aluminum. Have Ch. E. degree from prominent University. At present am Chief Chemist of large metallurgical concern. Desire position offering broader field of activity. Capable of organizing and directing research and technical control departments. Address

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Care THE METAL INDUSTRY

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SITUATION WANTED—Process and Layout Engineer Brass and Copper Mills all branches; department or complete units including buildings, conveying equipment, special machinery, etc. Quality, Quantity, Efficiency. 23 years' experience; 8 years with The American Brass Company, Member A. S. M. E., wishes position January first. Interview solicited.

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Care THE METAL INDUSTRY

Foreman Plater

SITUATION WANTED—By a practical foreman in plating, polishing and buffing department, still or mechanical. Expert on all kinds of electro deposits, also understands lacquering and japanning. Has had years of experience and has a good record as Executive in these departments.

Practical,
Care THE METAL INDUSTRY

Foundry Foreman

SITUATION WANTED—As Brass Foundry Foreman by one who understands the brass foundry, mix metals, understands machines and matchplate work. Can report at short notice.

W. H. E.,
Care THE METAL INDUSTRY.

FOUNDRYMAN

SITUATION WANTED—Brass, Bronze and Aluminum Foundryman desires position in Brooklyn or New York City.

FOUNDRYMAN,
Care THE METAL INDUSTRY.

FOREMAN

SITUATION WANTED — Shop Foreman with experience in making rods, bars, billets in brass, bronze, nickel silver and gun metal.

A. M. E.,
Care THE METAL INDUSTRY.

METALLURGIST

SITUATION WANTED — Technical Training, many years practical experience. Concentration, Roasting, Blast and Reverberatory Smelting, Converting, Furnace and Kettle Refining, Copper and Lead Ores. Non-ferrous scrap metal smelting, refining and alloying, Brass Foundry melting, Detroit Electric Furnaces. Prefer jobbing foundry or junk smelter in Mid-West. Address,

Metallurgist,
Care THE METAL INDUSTRY

SUPERINTENDENT

SITUATION WANTED—As General Foreman or Superintendent by man with several years' executive experience in the metal industry. Capable of increasing production, handling costs and systematizing. Expert on melting, rolling, screw machines, presses, plating and general fabrication of metals. Metallurgical Engineer by profession. References furnished by reliable manufacturers of silverware, jewelry, electrical fixtures and plumbing supplies. Consulting work considered.

P. O. B.
Care THE METAL INDUSTRY

Buffing and Polishing Compositions

Expert of 20 years' experience will install plants and furnish working formulas guaranteed to produce better goods than the average.

COMPOSITION
Care THE METAL INDUSTRY

General Foreman

SITUATION WANTED—Twenty years' experience in plating, polishing, lacquering and japanning. Also capable of taking charge of Power Press Department with efficient production. Will go anywhere.

PRODUCER
Care THE METAL INDUSTRY.

Foreman Plater

SITUATION WANTED—Forman Plater who is thoroughly familiar with the mixing and maintaining of plating solutions and oxidizing colors would like to hear from a small chandelier shop or where there would be steady position. Can handle all metals. Greater New York preferred.

JOHN MORRIS,
790 Madison Street, Brooklyn, N. Y.

PLATER

SITUATION WANTED—By a Plater with 23 years' experience gold, silver, nickel, brass, copper and stain finishes; capable of taking charge or installing plant. References.

GEORGE FROHM,
Care THE METAL INDUSTRY.

The

ANNUAL REVIEW NUMBER

of

THE METAL INDUSTRY

Issued in January, 1927

is in an advanced state of preparation and as usual is the best number of the year in which to start an advertisement.

Advertising order and copy should be sent before the first of the year to receive careful attention.

If we can aid you in preparing your advertisements, please write us.

THE METAL INDUSTRY
99 JOHN STREET
NEW YORK

AUDIT BUREAU OF CIRCULATIONS **ABC** Guarantees Quantity

MEMBER OF

ASSOCIATED BUSINESS PAPERS **ABP** Guarantees Quality

BUYERS' GUIDE: ADVERTISERS' PRODUCTS

(Advertisers are entitled to one listing for each sixteenth page of space)

ABRASIVE (Also see Emery.)
Alundum
Norton Co., Worcester, Mass.
Artificial
Abrasive Company, Bridesburg, Philadelphia, Pa.
General Abrasive Co., Niagara Falls, N. Y.
Stevens, Frederic B., Detroit, Mich.
Zucker Sons Co., Inc., Elizabeth, N. J.
Emery
Keystone Emery Mills, Philadelphia, Pa.

ACCUMULATORS, HYDRAULIC (Also see Hydraulic Machinery.)
Watson-Stillman Co., New York.

ACID PIPE
Du Pont de Nemours, E. I., & Co., Wilmington, Del.
Belke Mfg. Co., Chicago, Ill.

ACID
Resistance, Hard Rubber
Belke Mfg. Co., Chicago, Ill.

ACIDS
Chromic
Cooper, Chas., & Co., New York.
Hydrofluoric
General Chemical Co., Philadelphia, Pa.
Oil of Vitriol (Sulphuric)
Hegeler Zinc Co., Danville, Ill.
Zapon Co., The, New York, N. Y.

AEROPLANE DOPE
Du Pont de Nemours, E. I., & Co., Wilmington, Del.
Egyptian Lacquer Mfg. Co., New York.
Nikolas, G. J., Co., Chicago, Ill.
Zapon Co., The, New York, N. Y.
Mechanical
Belke Mfg. Co., Chicago, Ill.

AGITATORS FOR PLATING SOLUTIONS
Belke Mfg. Co., Chicago, Ill.
Mechanical
Belke Mfg. Co., Chicago, Ill.

AIR BRUSHES AND ACCESSORIES (See Sprayers; Spraying Accessories)

AIR COMPRESSORS
DeVilbiss Mfg. Co., Toledo, O.
Eureka Pneumatic Spray Co., Richmond Hill, N. Y.
Ideal Air Brush Mfg. Co., New York.
Nikolas, G. J., Co., Chicago, Ill.

AIR FILTERS
De Vilbiss Mfg. Co., Toledo, O.
Eureka Pneumatic Spray Co., Richmond Hill, N. Y.
Nikolas, G. J., Co., Chicago, Ill.

AIR TANKS
Nikolas, G. J., Co., Chicago, Ill.

ALLOYS (See also Kind Wanted)
Non-Ferrous
American Brass Co., Waterbury, Conn.
The Duriron Co., Dayton, Ohio.
Niagara Falls Smelting & Refining Corp., Buffalo, N. Y.
Brass, Bronze, Nickel Silver
American Brass Co., Waterbury, Conn.
Niagara Falls Smelting & Refining Corp., Buffalo, N. Y.

ALUMINUM (See Ingots, Sheets, Wire, Rod etc.)
Angles and Channels
Aluminum Company of America, Pittsburgh, Pa.
Sheet
Sheet Aluminum Co., Jackson, Mich.

ALUMINUM ALLOYS
Aluminum Company of America, Pittsburgh, Pa.
American Boron Products Co., Buffalo, N. Y.
Niagara Falls Smtg. & Refg. Corp., Buffalo, N. Y.

AMMETERS (See also Electrical Apparatus and Equipment.)
Connecticut Dynamo & Motor Co., Irvington, N. J.
Crown Rheostat & Supply Co., Chicago, Ill.
Hanson & Van Winkle Co., Newark, N. J.

AMYL ACETATE
Du Pont de Nemours, E. I., & Co., Wilmington, Del.
Egyptian Lacquer Mfg. Co., New York.
Maas & Waldstein Co., New York.
Nikolas, G. J., Chicago, Ill.
Zapon Co., The, New York, N. Y.

ANNEALING FURNACES
Electric
Oil or Gas
Monarch Engineering & Mfg. Co., Baltimore, Md.
Rockwell, W. S., Company, New York.
Surface Combustion Co., New York.

ANODES
Brass and Bronze
Anode Corp. of America, New York.
Apothecaries Hall Co., Waterbury, Conn.
Daniels & Orben Co., New York.
Harshaw, Fuller & Goodwin Co., Cleveland, O.
Lasalco, Inc., St. Louis, Mo.
MacDermid Incorporated, Waterbury, Conn.
Munning, A. P., & Co., New York-Chicago.
Seymour Mfg. Co., Seymour, Conn.
Stevens, Frederic B., Detroit, Mich.
U. S. Galvanizing & Plating Equipment Corp., Brooklyn, N. Y.
Cadmium
Graselli Chemical Co., Cleveland, Ohio.
Roessler & Hasslacher Chemical Co., New York, N. Y.
Udylite Process Co., Kokomo, Ind.
Copper
American Brass Company, Waterbury, Conn.
Anode Corp. of America, New York.
Apothecaries Hall Co., Waterbury, Conn.
Daniels & Orben Co., New York.
Hanson & Van Winkle Co., Newark, N. J.
Harshaw, Fuller & Goodwin Co., Cleveland, O.
Hussey, C. G., & Co., Pittsburgh, Pa.
Lasalco, Inc., St. Louis, Mo.
L'Hommedieu, Chas. F., & Sons Co., Chicago, Ill.
MacDermid Incorporated, Waterbury, Conn.
Munning, A. P., & Co., New York-Chicago.
Seymour Mfg. Co., Seymour, Conn.
Stutz, Geo. A., Mfg. Co., Chicago, Ill.
U. S. Galvanizing & Plating Equipment Corp., Brooklyn, N. Y.
Gold
Handy & Harman, New York.
Nickel
Anode Corp. of America, New York.
Apothecaries Hall Co., Waterbury, Conn.
Crown Rheostat & Supply Co., Chicago, Ill.
Hanson & Van Winkle Co., Newark, N. J.
Harshaw, Fuller & Goodwin Co., Cleveland, O.
L'Hommedieu, Chas. F., & Sons Co., Chicago, Ill.
Lasalco, Inc., St. Louis, Mo.
MacDermid Incorporated, Waterbury, Conn.
Munning, A. P., & Co., New York-Chicago.
Seymour Mfg. Co., Seymour, Conn.
Stevens, F. B., Detroit, Mich.
Stutz, Geo. A., Mfg. Co., Chicago, Ill.
U. S. Galvanizing & Plating Equipment Corp., Brooklyn, N. Y.
Platinum
Handy & Harman, New York.
Jackson, John J., Co., Newark, N. J.
Roessler & Hasslacher Chemical Co., New York.
Zinc
Anode Corp. of America, New York.
Apothecaries Hall Co., Waterbury, Conn.
Grasselli Company, The, Cleveland, Ohio.
Hanson & Van Winkle Co., Newark, N. J.
Harshaw, Fuller & Goodwin Co., Cleveland, O.
L'Hommedieu, Chas. F., & Sons Co., Chicago, Ill.
Meaker, The, Co., Chicago, Ill.
Munning, A. P., & Co., New York-Chicago.
Roessler & Hasslacher Chemical Co., New York, N. Y.
Stutz, Geo. A., Mfg. Co., Chicago, Ill.

ANTI-FRICTION METAL (See also Babbitt Metal and Bearings.)
Ajax Metal Co., Philadelphia, Pa.

ASSAY CRUCIBLES, Sand
Jonathan Bartley Crucible Co., Trenton, N. J.
Joseph Dixon Crucible Company, Jersey City, N. J.
Plumbago Crucible Association, The, New York.

ASSAYERS AND CHEMISTS (See also Testing Laboratories.)
Pitkin, Lucius, Inc., New York.

AUTOMATIC MACHINERY (See Kind Wanted)

AUTOMATIC POLISHING MACHINES
Acme Mfg. Co., Detroit, Mich.

AUTOMATIC WIRE AND SHEET METAL WORKING MACHINERY
Baird Machine Co., Bridgeport, Conn.

AUTOMOBILE FORGINGS
Scovill Mfg. Co., Waterbury, Conn.

BABBITT METAL (See also Bearings.)
Ajax Metal Co., Philadelphia, Pa.
Michigan Smelting & Refining Co., Detroit, Mich.

BABBITT MOLDS (See Molds.)

BALL BURNISHING EQUIPMENT (Also see Burnishing and Polishing Barrels.)
Abbott Ball Co., Hartford, Conn.
Baird Machine Co., Bridgeport, Conn.
Globe Machine & Stamping Co., Cleveland, Ohio.
Hanson & Van Winkle Co., Newark, N. J.
No-Dust Drying Machine Co., Waterbury, Conn.

BALLS & SPECIAL SHAPES—STEEL
Abbott Ball Co., Hartford, Conn.
Beaver, H. Leroy, Co., Philadelphia, Pa.

BARS; SILVER, GOLD, PLATINUM
Handy & Harmon, New York.

BEARINGS (Also see Babbitt Metal and Anti-Friction Metal.)
Babbitt
Ajax Metal Co., Philadelphia, Pa.

BLAST FORGES
Kirk & Blum Mfg. Co., Cincinnati, Ohio.

BLAST GATES
Kirk & Blum Mfg. Co., Cincinnati, Ohio.

BLOWERS AND BLOW PIPING (See also Exhaust Fans and Heads.)
Astle, H. J., & Co., Providence, R. I.
Cleveland Blow Pipe & Mfg. Co., Cleveland, Ohio.
Kirk & Blum Mfg. Co., Cincinnati, Ohio.
Monarch Engineering & Mfg. Co., Baltimore, Md.

BLOWERS, HIGH PRESSURE
Leiman Bros., New York.

BOILER INSULATION (See Brick, Insulating; Insulating Cement.)

BOILERS, SETTING (See Fire Cement.)

BOILERS, WATER TUBE
Babcock & Wilcox Co., New York.

BORONIC ALLOYS
American Boron Products Co., Buffalo, N. Y.

BRASS (See Brass Mill Products; Wire Mill Products; Anodes; Castings; Die Castings; Forgings; Ingots; Rods and Bars; Sheets; Strip Metal; Tubes; Wire.)

BRASS FOUNDERS (See Castings.)

BRASS FOUNDRY EQUIPMENT & SUPPLIES (See Kind Wanted.)

BRASS MILL ENGINEERS (See Engineers.)

BRASS MILL MACHINERY (Also See Kind Wanted.)
Mackintosh-Hemphill Co., Pittsburgh, Pa.

BRASS MILL PRODUCTS
Baltimore Brass Co., Baltimore, Md.
Scovill Mfg. Co., Waterbury, Conn.
Seymour Mfg. Co., Seymour, Conn.
Western Cartridge Co., East Alton, Ill.

BRASS ROLLING MILL MACHINERY
Torrington Mfg. Co., Torrington, Conn.

BRASS; SHEET, WIRE, ROD, TUBE (Also see Wire Mill Products; Rods and Bars; Sheets; Strip Metals; Tubes; Wire, Etc.)
American Brass Company, Waterbury, Conn.
Bristol Brass Co., Bristol, Conn.
Conklin, T. E., Brass & Copper Co., New York.
Dallas Brass & Copper Co., Chicago, Ill.
Hendricks Bros., New York.
Scovill Mfg. Co., Waterbury, Conn.
Seymour Mfg. Co., Seymour, Conn.
Taunton-New Bedford Copper Co., Taunton, Mass.

BRASS WORKING LATHES (See Lathes.)

BRICK
Cork Paving
Armstrong Cork & Insulation Co., Pittsburgh, Pa.
Insulating
Armstrong Cork & Insulation Co., Pittsburgh, Pa.

BRITANIA METAL
Standard Rolling Mills, Inc., Brooklyn, N. Y.

BRONZE (See also Anodes; Castings; Forgings; Ingots; Powdered; Rods and Bars; Tubes, Etc.)
Bearing
American Brass Co., Waterbury, Conn.
Niagara Falls Smtg. & Refg. Corp., Buffalo, N. Y.
Phosphor, Tobin, Manganese
American Brass Co., Waterbury, Conn.
Conklin, T. E., Brass & Copper Co., New York.
Niagara Falls Smtg. & Refg. Corp., Buffalo, N. Y.
Scovill Mfg. Co., Waterbury, Conn.

BRONZING LIQUID
Anderson Chemical Co., New York.
Du Pont de Nemours, E. I., & Co., Wilmington, Del.

BUYERS' GUIDE: ADVERTISERS' PRODUCTS

(Advertisers are entitled to one listing for each sixteenth page of space)

Egyptian Lacquer Mfg. Co., New York.
Nikolas, G. J., Co., Chicago, Ill.
Waukegan Chemical Co., Waukegan, Ill.
Zapon, The, Co., New York.
Zeller Lacquer Mfg. Co., New York.

Hand

Blumenthal, H., & Co., New York.
Hanson & Van Winkle Co., Newark, N. J.
Munning, A. P., & Co., New York-Chicago.
Nikolas, G. J., Co., Chicago, Ill.

Scratch Wheel

Linfante, J. L., Jersey City, N. J.

Wheel

Blumenthal, H., & Co., New York.
Hanson & Van Winkle Co., Newark, N. J.
L'Hommedieu, Chas. F., & Sons Co., Chicago, Ill.
Munning, A. P., & Co., New York-Chicago.

BUFFING AND POLISHING COMPOSITION

Apothecaries Hall Co., Waterbury, Conn.
Buchanan, Thos., Co., Cincinnati, Ohio.
Crown Rheostat & Supply Co., Chicago, Ill.
Daniels & Orben Co., Inc., New York.
Hanson & Van Winkle Co., Newark, N. J.
L'Hommedieu, Chas. F., & Sons Co., Chicago, Ill.
Lasalco, Inc., St. Louis, Mo.
Matchless Metal Polish Co., Chicago, Ill.—Glen Ridge, N. J.
Munning, A. P., & Co., New York-Chicago.
Oden Corp., College Point, L. I., N. Y.
Stevens, Frederic B., Detroit, Mich.
Stutz, Geo. A., Mfg. Co., Chicago, Ill.
Williamsville Buff Mfg. Co., Danielson, Conn.
Zucker Sons Co., Inc., Elizabeth, N. J.

BUFFING AND POLISHING MACHINES (See Polishing and Buffing Machines)

BUFFING MACHINES AUTOMATIC (Also see Polishing Lathes and Heads.)

Divine Bros. Co., Utica, N. Y.

BUFFING AND POLISHING WHEELS (Also See Buffs.)

Canvas, Cotton, Etc.

Advance Wheel Mfg. Co., Chicago, Ill.
Bias Buff & Wheel Co., New York, N. Y.
Buchanan, Thos., Co., Cincinnati, Ohio.
Codman, F. L. & J. C., Co., So. Boston, Mass.
Crown Rheostat & Supply Co., Chicago, Ill.
Daniels & Orben Co., Inc., New York.
Divine Bros. Co., Utica, N. Y.
Eastern Felt Co., Winchester, Mass.
Guaranteed Buff Co., Brooklyn, N. Y.
Hanson & Van Winkle Co., Newark, N. J.
Lasalco, Inc., St. Louis, Mo.
Lea Mfg. Co., The, Waterbury, Conn.
L'Hommedieu, Chas. F., & Sons Co., Chicago, Ill.
Munning, A. P., & Co., New York-Chicago.
Williamsville Buff Mfg. Co., Danielson, Conn.

Felt

Codman, F. L. & J. C., Co., So. Boston, Mass
Divine Bros. Co., Utica, N. Y.
Eastern Felt Co., Winchester, Mass.
Hanson & Van Winkle Co., Newark, N. J.
Pressed Leather Wheel Co., Little Falls, N. Y.

Leather

Divine Bros. Co., Utica, N. Y.

Sheepskin

Codman, F. L. & J. C., Co., So. Boston, Mass.
Hanson & Van Winkle Co., Newark, N. J.

BUFFS (Also see Buffing and Polishing Wheels.)

Bias Buff & Wheel Co., New York, N. Y.
Buchanan, Thos., Co., Cincinnati, Ohio.
Codman, F. L. & J. C., Co., So. Boston, Mass.
Crown Rheostat & Supply Co., Chicago, Ill.
Divine Bros. Co., Utica, N. Y.
Guaranteed Buff Co., Brooklyn, N. Y.
Hanson & Van Winkle Co., Newark, N. J.
Lasalco, Inc., St. Louis, Mo.
L'Hommedieu, Chas. F., & Sons Co., Chicago, Ill.
MacDermid Incorporated, Waterbury, Conn.
Munning, A. P., & Co., New York-Chicago.
Oden Corp., College Point, L. I., N. Y.
Pressed Leather Wheel Co., Little Falls, N. Y.
Stutz, Geo. A., Mfg. Co., Chicago, Ill.
Williamsville Buff Mfg. Co., Danielson, Conn.

BUILDING PAINT SPRAYERS

DeVilbiss Mfg. Co., Toledo, O.

BURNERS (Also see Furnaces.)

Air and Gas Pre-Mixing

Campbell-Hausfeld Co., Harrison, Ohio.
Monarch Engineering & Mfg. Co., Baltimore, Md.

Air and Gas Pre-Mixing

Campbell-Hausfeld Co., Harrison, Ohio.

Oil or Gas

Campbell Hausfeld Co., Harrison, Ohio.
Johnson Gas Appliance Co., Cedar Rapids, Ia.

BURNISHING AND POLISHING BARRELS

Abbott Ball Co., Hartford, Conn.
Baird Machine Co., Bridgeport, Conn.
Crown Rheostat & Supply Co., Chicago, Ill.
Globe Machine & Stamping Co., Cleveland, Ohio.
Hanson & Van Winkle Co., Newark, N. J.
Henderson Bros. Co., Waterbury, Conn.
No-Dust Drying Machine Co., Waterbury, Conn.
Smith-Richardson Co., Attleboro, Mass.

BURNISHING COMPOUNDS AND CHIPS (Also see Soap.)

Abbott Ball Co., Hartford, Conn.
Beaver, H. Leroy, Co., Philadelphia, Pa.
International Chemical Co., Philadelphia, Pa.

CABLING MACHINERY

Torrington Mfg. Co., Torrington, Conn.

CADMIUM PLATING

Grasselli Chemical Co., Cleveland, Ohio.
Pyrene Mfg. Co., Newark, N. J.

CANVAS WHEELS (See Buffing and Polishing Wheels.)

CARBONATE OF COPPER

Hanson & Van Winkle Co., Newark, N. J.
Hardy, Chas., Inc., New York.

CARBOY DUMPERS

Hanson & Van Winkle Co., Newark, N. J.

CASTINGS

Aluminum

Aluminum Company of America, Pittsburgh, Pa.
Scovill Mfg. Co., Waterbury, Conn.

Brass, Bronze and Composition

Ajax Metal Co., Philadelphia, Pa.
Scovill Mfg. Co., Waterbury, Conn.

Acid Proof

The Duriron Co., Dayton, Ohio.

CAUSTIC SODA

Buchanan, The Thos., Co., Cincinnati, Ohio.
International Chemical Co., Philadelphia, Pa.
Roessler & Hasslacher Chemical Co., New York.

CEMENT (See Fire Cement; Insulating Cement.)

CEMENT

Furnace

Campbell-Hausfeld Co., Harrison, Ohio.

CENTRIFUGAL DRYERS AND EXTRACTORS (Also see Drying-Out Machines.)

Tolhurst Machine Works, Troy, N. Y.

CHAIN GRATE STOKERS

Babcock & Wilcox Co., New York.

CHEMICALS, DEALERS IN ALL KINDS (Also see Kind Wanted.)

Platers

Chas. Cooper & Co., New York.
Roessler & Hasslacher Chemical Co., New York, N. Y.

CHEMISTS, CONSULTING (See Assayers and Chemists; Testing Laboratories.)

CHLORIDE OF COPPER

Chas. Cooper & Co., New York.

Nickel

Chas. Cooper & Co., New York.

Silver

Chas. Cooper & Co., New York.

CHROMIUM

Chromium Corporation of America New York City

CHROMIUM PLATING

Chromium Corporation of America New York City
New Haven Sherardizing Co., The, Hartford, Conn.
Pyrene Mfg. Co., Newark, N. J.

CHROMIUM PLATING POLISH

Zucker Sons Co., Inc., Elizabeth, N. J.

CHUCKING MACHINES, AUTOMATIC

Baird Machine Co., Bridgeport, Conn.

CHUCKS

Spinning

Pryibil, P., Machine Co., New York.

Oval

Pryibil, P., Machine Co., New York.

CINDER CRUSHERS (See Crushers and Pulverizers; Reclaiming Machinery.)

CLEANERS, METAL, WASTE, GENERAL

Cowles Detergent Co., Cleveland, Ohio.
Ford, J. B., Co., Wyandotte, Mich.
Fuller, W. A., Co., Greensburg, Pa.
International Chemical Co., Philadelphia, Pa.
MacDermid Incorporated, Waterbury, Conn.
Magnus Chemical Co., Brooklyn, N. Y.
Magnuson Products Corp., Brooklyn, N. Y.
Oakite Products, Inc., New York, N. Y.

CLEANING APPARATUS, AUTOMATIC METAL (Also see Pickling Machines.)

U. S. Galvanizing & Plating Equipment Corp., Brooklyn, N. Y.

CLEANING COMPOUNDS (See also Fig Cleaner; Pickling Compounds, Whale Oil Soaps.)

Metal

Anthony, H. M., Co., New York.
Apothecaries Hall Co., Waterbury, Conn.
Cowles Detergent Co., Cleveland, Ohio.
Ford, J. B., Co., Wyandotte, Mich.
Fuller, W. A., Co., Greensburg, Pa.
Hanson & Van Winkle Co., Newark, N. J.
International Chemical Co., Philadelphia, Pa.
L'Hommedieu, Chas. F., & Sons Co., Chicago, Ill.
MacDermid, Inc., Waterbury, Conn.
Magnus Chemical Co., Brooklyn, N. Y.
Magnuson Products Corp., Brooklyn, N. Y.
Matchless Metal Polish Co., Chicago, Ill.—Glen Ridge, N. J.
Munning, A. P., & Co., New York-Chicago.
Oakite Products, Inc., New York, N. Y.
Stevens, Frederic B., Detroit, Mich.

COCK GRINDERS

Automatic

Turner Foundry & Machine Co., Phila., Pa.

COCKS

Acid Proof

Duriron, The, Co., Inc., Dayton, Ohio.

COILERS, SHEET METAL

Blake & Johnson Company, Waterbury, Conn.

COMMUTATORS

Belke Mfg. Co., Chicago, Ill.

COMPOSITION METAL (See Castings; Ingot, Etc.)

Greaseless, for Metal Finishing

Lea Mfg. Co., The, Waterbury, Conn.

COMPOSITIONS (See Buffing and Polishing Composition; Flooring Compositions.)

Hanson & Van Winkle Co., Newark, N. J.

COMPOUNDS, CUTTING AND GRINDING, DRAWING, STAMPING

International Chemical Co., Philadelphia, Pa.
Magnuson Products Corp., Brooklyn, N. Y.
Oakite Products, Inc., New York, N. Y.

COMPRESSORS, AIR & GAS (See Air Compressors.)

CONCENTRATING TABLES (See also Reclaiming Machinery.)

Hardinge Company, New York.

CONTRACT WORK (See Castings; Die-Casting; Dies; Electro-Galvanizing; Electro-Plating; Forgings; Hot Galvanizing and Tinning; Plating, Barrel Method; Polishing and Burnishing, Etc.)

COPPER (Also see Anodes; Castings; Ingots, Rods and Bars; Sheets; Smelters and Refiners; Strip Metal; Tubes; Wire, Etc.)

Sheet, Wire, Rod, Tube

American Brass Co., Waterbury, Conn.
Conklin, T. E., Brass & Copper Co., New York.

COPPER-ALUMINUM, Boronic

American Boron Products Co., Buffalo, N. Y.

COPPER BEARING MATERIAL, BUYERS OF (See Drosses, Residues, Etc.)

COPPER BORONIC

American Boron Products Co., Buffalo, N. Y.

COPPER, CARBONATE OF

Crown Rheostat & Supply Co., Chicago, Ill.
Daniels & Orben Co., New York.
Roessler & Hasslacher Chemical Co., New York, N. Y.

COPPER-CYANIDE

American Cyanamid Co., New York.
Hardy, Chas., Inc., New York.
Roessler & Hasslacher Chemical Co., New York.
Zapon Co., The, New York, N. Y.

COPPER-NICKEL, BORONIC

American Boron Products Co., Buffalo, N. Y.

CORE MACHINES

Stevens, Frederic B., Detroit, Mich.

CORE OIL AND COMPOUNDS

Stevens, Frederic B., Detroit, Mich.

BUYERS' GUIDE: ADVERTISERS' PRODUCTS

(Advertisers are entitled to one listing for each sixteenth page of space)

CORE OVEN INSULATION (See Brick Insulating; Insulating Cement; Insulating Oven.

CORE OVENS

Coal and Coke
Monarch Engineering & Mfg. Co., Baltimore.
Steiner, E. E., & Co., Newark, N. J.
Stevens Frederic B., Detroit, Mich.

Oil and Gas
Monarch Engineering & Mfg. Co., Baltimore, Md.
Stevens Frederic B., Detroit, Mich.

CORE CABLES
Malleable Iron Fittings Co., Branford, Conn.

COUPLES
Bartley, Jonathan, Crucible Co., Trenton, N. J.
Dixon, Joseph, Crucible Co., Jersey City, N. J.

CRUCIBLES, METAL MELTING
Bartley, Jonathan, Crucible Co., Trenton, N. J.
Dixon, Joseph, Crucible Co., Jersey City, N. J.
Lava Crucible Co. of Pittsburgh, Pittsburgh, Pa.
McCullough-Dalzell Crucible Co., Pittsburgh, Pa.
Naugatuck Valley Crucible Co., Shelton, Conn.
Plumbago Crucible Association, The, New York.
Ross Tacony Crucible Co., Tacony, Philadelphia, Pa.
Stevens, Frederic B., Detroit, Mich.

CRUCIBLE TONGS (See Tongs.)

CRUSHERS AND PULVERIZERS (See also Reclaiming Machinery.)
Farrel Foundry & Machine Co., Ansonia, Conn.
Hardinge Company, New York.
Standard Equipment Co., New Haven, Conn.

CUPRO-NICKEL (See Brass Mill Products.)

CUTTING, STRAIGHTENING & FORMING MACHINERY

Wire
Baird Machine Co., Bridgeport, Conn.
Shuster, F. B., Co., New Haven, Conn.

Strip Metal
Baird Machine Co., Bridgeport, Conn.
Shuster, F. B., Co., New Haven, Conn.

CYANIDE (See also Copper-Cyanide; Silver Cyanide; Sodium Cyanide; Zinc Cyanide)
American Cyanamid Co., New York.
Buchanan, Thos., Co., Cincinnati, Ohio.
Crown Rheostat & Supply Co., Chicago, Ill.
Hanson & Van Winkle Co., Newark, N. J.

DEOXIDIZERS, METAL (See Fluxes

DIE CASTINGS

Aluminum
Aluminum Company of America, Pittsburgh, Pa.

DIE CASTING MACHINES

Soft Metal
Byrd, R. E., Erie, Pa.

DIPPING BASKETS

Automatic
U. S. Galvanizing & Plating Equipment Corp., Brooklyn, N. Y.

Dipping and Plating
Smith, John P., Co., New Haven, Conn.

Stoneware
Hanson & Van Winkle Co., Newark, N. J.

DRAW BENCHES

Wire, Rod, Tube
Farrel Foundry & Machine Co., Ansonia, Conn.
Watson-Stillman Co., New York.

Light Wire
Leiman Bros., New York.

DRAWING AND STAMPING (See Metal Goods Made to Order; Stamping and Drawing.)

DRILLING MACHINES

Light Sensitive
Leiman Bros., New York.

DRINKING WATER SUPPLY SYSTEMS
Armstrong Cork & Insulation Co., Pittsburgh, Pa.

DROP LIFTERS (See also Presses, Drop Lifters for.)

Automatic
Miner & Peck Mfg. Co., Derby, Conn.

DROSSES, RESIDUES, ETC., BUYERS OF (Also see Metal Dealers, Old.)
Balbach Metals Corp., New York, N. Y.
Nassau Smelting & Refining Co., New York.

DRYERS (See Centrifugal Dryers; Ovens; Drying-Out Machines; Ladle Heaters and Dryers; Mold Dryers; and Dryers; Sawdust Drying-Out Boxes.)
No-Dust Drying Machine Co., Waterbury, Conn.

DRYING-OUT MACHINES (See also Centrifugal Dryers and Extractors; Sawdust Drying-Out Boxes.)
Baird Machine Co., Bridgeport, Conn.
Smith-Richardson Co., Attleboro, Mass.

Automatic
Astle, H. J., & Co., Providence, R. I.
Tolhurst Machine Works, Troy, N. Y.
U. S. Galvanizing & Plating Equipment Corp., Brooklyn, N. Y.

DUST COLLECTORS AND VENTILATING SYSTEMS (Also see Exhaust Fans and Heads.)
Allington & Curtis Co., Saginaw, Mich.
Astle, H. J., & Co., Providence, R. I.
Cleveland Blow Pipe & Mfg. Co., Cleveland, Ohio.
Kirk & Blum Mfg. Co., Cincinnati, Ohio.
No-Dust Drying Machine Co., Waterbury, Conn.
Pangborn Corp., Hagerstown, Md.

BRUSHES

DYNAMOS, LOW VOLTAGE, PLATING AND GALVANIZING (Also see Electrical Apparatus and Equipment.)
Bogue, Chas. J., Electric Co., New York.
Chandeysson Electric Co., St. Louis, Mo.
Connecticut Dynamo & Motor Co., Irvington, N. J.
Crown Rheostat & Supply Co., Chicago, Ill.
Eager Electric Co., Watertown, N. Y.
Hanson & Van Winkle Co., Newark, N. J.
Jantz & Leist Electric Co., Cincinnati, Ohio.
L'Hommedieu, Chas. F., & Sons Co., Chicago, Ill.
Meaker, The, Co., Chicago, Ill.
Munning, A. P., & Co., New York-Chicago.
Stevens, Frederic B., Detroit, Mich.
Stutz, Geo. A., Mfg. Co., Chicago, Ill.
U. S. Galvanizing & Plating Equipment Corp., Brooklyn, N. Y.

DYNAMOS, PLATING, USED
Fuerst-Friedman Co., Cleveland, Ohio.
J. Holland Sons, Brooklyn, N. Y.

ELECTRIC CRANES (See Cranes.)

ELECTRIC FURNACES

Heat Treating

Melting
Ajax Metal Co., Philadelphia, Pa.

Refractories
Bartley, Jonathan, Crucible Co., Trenton, N. J.
Norton Co., Worcester, Mass.

ELECTRIC HOISTS (See Hoists)

ELECTRIC OVENS (See Ovens; also Core Ovens.)

ELECTRICAL APPARATUS AND EQUIPMENT (Also see Ammeters, Rheostats, Switchboards, Transformers, Voltmeters.)
Bogue, Chas. J., Electric Co., New York.
Hanson & Van Winkle Co., Newark, N. J.

ELECTRICAL CONDUCTORS

Aluminum
Aluminum Company of America, Pittsburgh, Pa.

ELECTRO GALVANIZING EQUIPMENT AND SUPPLIES (See Dynamos; Plating Barrels; Plating Machines, Automatic; Tanks, etc.)
Meaker, The, Co., Chicago, Ill.
U. S. Galvanizing & Plating Equipment Corp., Brooklyn, N. Y.

ELECTRO-GALVANIZING, JOB AND CONTRACT
Hassall, John, Inc., Brooklyn, N. Y.
Meaker, The, Co., Chicago, Ill.
Smith & McCrorken, Brooklyn, N. Y.
U. S. Galvanizing & Plating Equipment Corp., Brooklyn, N. Y.

ELECTRO PLATING EQUIPMENT AND SUPPLIES (See also Kind Wanted.)
Hanson & Van Winkle Co., Newark, N. J.

ELECTRO PLATING JOB & CONTRACT (Also see Polishing and Burnishing; Plating, Barrel Method.)
Brunell Co., A. A., Worcester, Mass.
Chromium Corporation of America New York City
Hassall, John, Inc., Brooklyn, N. Y.
Meaker, The, Co., Chicago, Ill.
Langbein, Wm., & Bros., Brooklyn, N. Y.
New Haven Sherardizing Co., The, Hartford, Conn.
Pyrene Mfg. Co., Newark, N. J.

EMERY (Also see Abrasives.)
Crown Rheostat & Supply Co., Chicago, Ill.
Keystone Emery Mills, Philadelphia, Pa.
Matchless Metal Polish Co., Chicago, Ill.—Glen Ridge, N. J.
Norton Company, Worcester, Mass.
Stevens, Frederic B., Detroit, Mich.

EMERY PASTE
Harshaw, Fuller & Goodwin Co., Philadelphia, Pa.

ENAMELING OVENS (See Ovens.)

ENAMELS

Colored
Du Pont de Nemours, E. I., & Co., Wilmington, Del.
Egyptian Lacquer Mfg. Co., New York.
Hilo Varnish Corp., Brooklyn, N. Y.
Lacquer & Chemical Corp., Brooklyn, N. Y.
Maas & Waldstein Co., New York.
Nikolas, G. J., & Co., Chicago, Ill.
Waukegan Chemical Co., Waukegan, Ill.
Zapon, The, Co., New York.
Zeller Lacquer Mfg. Co., New York.

Lacquer
Du Pont de Nemours, E. I., & Co., Wilmington, Del.
Egyptian Lacquer Mfg. Co., New York.
Hilo Varnish Corp., Brooklyn, N. Y.
Lacquer & Chemical Corp., Brooklyn, N. Y.
Maas & Waldstein Co., New York.
Nikolas, G. J., Co., Chicago, Ill.
Waukegan Chemical Co., Waukegan, Ill.
Zapon, The, Co., New York.
Zeller Lacquer Mfg. Co., New York.

Wood
Du Pont de Nemours, E. I., & Co., Wilmington, Del.
Egyptian Lacquer Mfg. Co., New York.
Hilo Varnish Corp., Brooklyn, N. Y.
Lacquer & Chemical Corp., Brooklyn, N. Y.
Maas & Waldstein Co., New York.
Waukegan Chemical Co., Waukegan, Ill.
Zapon, The, Co., New York.
Zeller Lacquer Mfg. Co., New York.

ENAMEL SPRAYERS (See Sprayers.)

Furnace
Monarch Engineering & Mfg. Co., Baltimore, Md

Polishing and Grinding
Divine Bros. Co., Utica, N. Y.

ENGINEERS, POLISHING AND GRINDING

Metal Finishing
Divine Bros. Co., Utica, N. Y.
Norton Co., Worcester, Mass.

EQUIPMENT

Chromium Plating
Chromium Corporation of America New York City
Hanson & Van Winkle Co., Newark, N. J.

ESCUTCHEON PINS, ALL METAL
Hassall, John, Inc., Brooklyn, N. Y.

ETHYL ACETATE
Du Pont de Nemours, E. I., & Co., Wilmington, Del.
Nikolas, G. J., & Co., Chicago, Ill.
Zapon Co., The, New York, N. Y.

EXHAUST BOOTHS AND BENCHES FOR LACQUERING
Cleveland Blow Pipe & Mfg. Co., Cleveland, Ohio.
Eureka Pneumatic Spray Co., Richmond Hill, N. Y.

EXHAUST FANS AND HEADS (Also see Blowers and Blow Piping; Dust Collectors and Ventilating Systems.)
Kirk & Blum Mfg. Co., Cincinnati, Ohio.

Acid Proof
Duriron, The, Co., Inc., Dayton, Ohio.

EXTRUDED SHAPES

Brass, Copper and Bronze
Scovill Mfg. Co., Waterbury, Conn.

FACINGS (See Foundry Facings.)

FELT, POLISHING
Eastern Felt Company, Winchester, Mass.
Hanson & Van Winkle Co., Newark, N. J.

FELT POLISHING WHEELS
Codman, F. L. & J. C., Co., So Boston, Mass.
Crown Rheostat & Supply Co., Chicago, Ill.
Divine Bros. Co., Utica, N. Y.
Eastern Felt Co., Winchester, Mass.
Hanson & Van Winkle Co., Newark, N. J.

FELT SHEETS
Eastern Felt Company, Winchester, Mass.
Hanson & Van Winkle Co., Newark, N. J.

FELT WHEELS
Eastern Felt Company, Winchester, Mass.
Hanson & Van Winkle Co., Newark, N. J.

BUYERS' GUIDE: ADVERTISERS' PRODUCTS

(Advertisers are entitled to one listing for each sixteenth page of space)

FERRULES, BRASS AND COPPER
American Brass Co., Waterbury, Conn.

FIG CLEANERS (Also see Cleaning Compounds, Whale Oil Soap.)
International Chemical Co., Philadelphia, Pa.

FILM COATINGS
Waukegan Chemical Co., Waukegan, Ill.

FILTER, TANK
Belke Mfg. Co., Chicago, Ill.

FILTER AERATING & AGITATING SYSTEM
Belke Mfg. Co., Chicago, Ill.

FILTER SYSTEM FOR PLATING SOLUTIONS
Belke Mfg. Co., Chicago, Ill.

FIRE BRICK
Jonathan Bartley Crucible Co., Trenton, N. J.
Norton Co., Worcester, Mass.

FIRE CEMENT
Jonathan Bartley Crucible Co., Trenton, N. J.
Campbell-Hausfeld Co., Harrison, Ohio.
Dixon, Joseph, Crucible Co., Jersey City, N. J.
Lava Crucible Co. of Pittsburgh, Pittsburgh, Pa.
Norton Co., Worcester, Mass.
Quigley Furnace Specialties Co., New York.

FIRE SAND
Norton Co., Worcester, Mass.

FITTINGS (Acid Resistance)

FLOORING COMPOSITION
Armstrong Cork & Insulation Co. Pittsburgh, Pa.

FLUXES

Metal Melting
American Boron Products Co., Buffalo, N. Y.

Soldering and Tinning
Johnson Mfg. Co., Chicago, Ill.
Zapon Co., The, New York, N. Y.

FORGINGS (Also see Automobile Forgings.)

Aluminum
Aluminum Company of America, Pittsburgh, Pa.

Brass and Bronze
Scovill Mfg. Co., Waterbury, Conn.

FOUNDRY EQUIPMENT AND SUPPLIES (See Kind Wanted.)
Campbell-Hausfeld Co., Harrison, Ohio.

FOUNDRY ENGINEERS (See Engineers.)

FOUNDRY FACINGS
Bartley, Jonathan, Crucible Co., Trenton, N. J.
Dixon, Joseph, Crucible Co., Jersey City, N. J.
Plumbago Crucible Association, The, New York.
Stevens, Frederic B., Detroit, Mich.

FOUNDRY RIDDLES (See Sand Sifters.)

FOUNDRY SPRAYERS (See Sprayers.)

Frictions
Divine Bros. Co., Utica, N. Y.

FURNACE CEMENT (See also Fire Cement.)
Campbell-Hausefeld Co., Harrison, Ohio.

FURNACE ENGINEERS (See Engineers.)

FURNACE INSULATION (See Brick Insulating; Insulating Cement; Insulation, Furnace.)

FURNACES (See Annealing Furnaces; Burners; Electric Furnaces; Galvanizing & Tinning Furnaces; Heat Treating Furnaces; Melting Furnaces; Powdered Coal Burning Furnaces; Sherardizing Furnaces; Smelting Furnaces.)
Ajax Metal Co., Philadelphia, Pa.

FURNACE TILE AND LININGS (Also see Fire Brick.)
Monarch Engineering & Mfg. Co., Baltimore, Md.
Quigley Furnace Specialties Co., New York.

FUSE METAL
Platt Bros. & Co., Waterbury, Conn.

FUSEL OIL
Nikolas, G. J., & Co., Chicago, Ill.

GALVANIZING (See also Electro Galvanizing Job, and Contract; Hot Galvanizing, Job and Contract.)

GALVANIZING AND TINNING FURNACES (Also see Burners.)
Monarch Engineering & Mfg. Co., Baltimore, Md.

GALVANIZING EQUIPMENT AND SUPPLIES (See Kinds Wanted. Also Plating Galvanizing Machines, Automatic; Hot and Galvanizing Barrels; Plating and Galvanizing and Tinning Equipment.)

GAS APPLIANCES
Johnson Gas Appliance Co., Cedar Rapids, Ia.

GAS BURNERS (See Burners.)

GATE CUTTERS (See Saws; Sprue Cutters.)

GENERATORS (See Dynamos; Motor-Generator Sets.)
Chandeysson Electric Co., St. Louis, Mo.
Ideal Electric Mfg. Co., Mansfield, Ohio.

GLUE FOR POLISHING
Daniels & Orben Co., New York.
Divine Bros. Co., Utica, N. Y.
Hanson & Van Winkle Co., Newark, N. J.

GLUE HEATERS AND POTS
Divine Bros. Co., Utica, N. Y.
Hanson & Van Winkle Co., Newark, N. J.

GOLD (See Anodes; Bars; Metal Dealers; Smelters and Refiners.)

GOLD, BORONIC
American Boron Products Co., Buffalo, N. Y.

GRAPHITE PRODUCTS PHOSPHORIZERS STIRRERS, ETC. (Also see Crucibles.)
Bartley, Jonathan, Crucible Co., Trenton, N. J.
Dixon, Joseph, Crucible Co., Jersey City, N. J.
McCullough-Dalzell Crucible Co., Pittsburgh, Pa.
Naugatuck Valley Crucible Co., Shelton, Conn.
Plumbago Crucible Association, The, New York.
Ross-Tacony Crucible Co., Tacony, Philadelphia, Pa.

GREASELESS COMPOSITIONS
Lea Mfg. Co., The, Waterbury, Conn.

GRINDING MACHINES
Cleveland Armature Wks., Cleveland, Ohio.
Divine Bros. Co., Utica, N. Y.
Norton Co., Worcester, Mass.
Stevens, Frederic B., Detroit, Mich.

GRINDING WHEEL HOODS (See Dust Collectors and Ventilating Systems; Hoods.)

HARD RUBBER FITTINGS
Belke Mfg. Co., Chicago, Ill.

Pipe
Belke Mfg. Co., Chicago, Ill.

HOODS (Also see Dust Collectors and Ventilating Systems.)

Polishing and Grinding Wheel
Cleveland Blow Pipe & Mfg. Co., Cleveland, Ohio.
Kirk & Blum Mfg. Co., Cincinnati, Ohio.

Spraying
De Vilbiss Mfg. Co., Toledo, Ohio.

HOT GALVANIZING AND TINNING EQUPMENT (See Burners; Galvanizing and Tinning Furnaces; Kettles; Tanks.)

HOT TINNING EQUIPMENT (See Hot Galvanizing and Tinning Equipment.)

HYDRAULIC MACHINERY, PRESSES, JACKS, ETC. (Also see Accumulators, Presses.)
Farrel Foundry & Machine Co., Ansonia, Conn.
Watson-Stillman Co., New York.

INGOT MOLDS (See Molds.)

INGOTS (Also see Calcium-Copper; Manganese-Copper; Phosphor-Copper; Phosphor-Tin; Silicon-Copper; Smelters and Refiners.)

Aluminum
Aluminum Company of America, Pittsburgh, Pa.
British Aluminum Co., New York and Toronto, Ontario.
Niagara Falls Smelting & Refining Corp., Buffalo, N. Y.

Brass, Bronze and Composition
Ajax Metal Company, Philadelphia, Pa.
Balbach Metals Corp., New York.
Belmont Smelting & Refining Works, Brooklyn, N. Y.
Niagara Falls Smelting & Refining Corp., Buffalo, N. Y.

Copper
Balbach Metals Corp., New York, N. Y.
Hendricks Bros., New York.
Trotter, Nathan, & Co., Philadelphia, Pa.

Lead
United Metals Selling Co., New York.

Manganese-Bronze
Niagara Falls Smelting & Refining Corp., Buffalo, N. Y.

Silver
Handy & Harmon, New York.

Tin
Ajax Metal Co., Philadelphia, Pa.

White Metals
Balbach Metals Corp., New York.
Michigan Smelting & Refining Co., Detroit, Mich.

INSULATING BRICK, BLOCK, POWDER AND CEMENT (See also Brick.)
Armstrong Cork & Insulation Co., Pittsburgh, Pa.

INSULATING CEMENT, HEAT
Armstrong Cork & Insulation Co., Pittsburgh, Pa.
Quigley Furnace Specialties Co., New York.

INSULATION (Also see Brick, Insulating, Insulating Cement.)

Boiler
Armstrong Cork & Insulation Co., Pittsburgh, Pa.

Oven
Armstrong Cork & Insulation Co., Pittsburgh, Pa.

Furnace
Armstrong Cork & Insulation Co., Pittsburgh, Pa.

Pipe
Armstrong Cork & Insulation Co., Pittsburgh, Pa.

IRON CASTINGS (See Castings.)

JAPAN REMOVERS
International Chemical Co., Philadelphia, Pa.
Magnus Chemical Co., Brooklyn, N. Y.
Oakite Products, Inc., New York, N. Y.

JAPANS, ALL KINDS
DuPont de Nemours, E. I., & Co., Wilmington, Del.
Hilo Varnish Corp., Brooklyn, N. Y.
Pittsburgh Lacquer Co., Pittsburgh, Pa.
Zapon Co., The, New York, N. Y.

JAPANNING BARRELS (See Tumbling Barrels.)

JAPANNING OVENS (See Ovens.)

JEWELERS' BRUSHES (See Brushes.)

JEWELERS' EQUIPMENT (Also see Kind Wanted.)
Leiman Bros., New York.
Smith-Richardson Co., Attleboro, Mass.

JEWELERS' ROLLS (See Rolls.)

JEWELERS' SOLDER (See Solders.)

JIGS, FIXTURES, ETC. (See Tools, Jigs, Fixtures.)

LABORATORY WARE
Norton Co., Worcester, Mass.

LABORATORIES (See Testing Laboratories.)

LACQUERING BARRELS (See Tumbling Barrels.)

Job and Contract
Brunell Co., A. A., Worcester, Mass.

LACQUER ENAMELS (See Enamels.)
Lacquer & Chemical Corp., Brooklyn, N. Y.
Pittsburgh Lacquer and Chemical Co., Pittsburgh, Pa.
Zeller Lacquer Mfg. Co., New York.

BUYERS' GUIDE: ADVERTISERS' PRODUCTS

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LACQUER OVENS (See Ovens.)

LACQUERS

Colored

DuPont de Nemours, E. I., & Co., Wilmington, Del.
Egyptian Lacquer Mfg. Co., New York.
Hilo Varnish Corp., Brooklyn, N. Y.
Lacquer & Chemical Corp., Brooklyn, N. Y.
Maas & Waldstein Co., New York.
Nikolas, G. J., Co., Chicago, Ill.
Pittsburgh Lacquer and Chemical Co., Pittsburgh, Pa.
Waukegan Chemical Co., Waukegan, Ill.
Zapon, The, Co., New York.
Zeller Lacquer Mfg. Co., New York.

For Incandescent Lamps

Egyptian Lacquer Mfg. Co., New York.

Metal

Anderson Chemical Co., New York.
Apothecaries Hall Co., Waterbury, Conn.
DuPont de Nemours, E. I., & Co., Wilmington, Del.
Egyptian Lacquer Mfg. Co., New York.
Lacquer & Chemical Corp., Brooklyn, N. Y.
Maas & Waldstein Co., New York.
Nikolas, G. J., Co., Chicago, Ill.
Pittsburgh Lacquer and Chemical Co., Pittsburgh, Pa.
Waukegan Chemical Co., Waukegan, Ill.
Zapon Co., The, New York.
Zeller Lacquer Mfg. Co., New York.

Wood

Anderson Chemical Co., New York.
DuPont de Nemours, E. I., & Co., Wilmington, Del.
Egyptian Lacquer Mfg. Co., New York.
Lacquer & Chemical Corp., Brooklyn, N. Y.
Maas & Waldstein Co., New York.
Pittsburgh Lacquer and Chemical Co., Pittsburgh, Pa.
Waukegan Chemical Co., Waukegan, Ill.
Zapon, The, Co., New York.
Zeller Lacquer Mfg. Co., New York.

LACQUER REMOVERS

Egyptian Lacquer Mfg. Co., New York.
International Chemical Co., Philadelphia, Pa.
Magnus Chemical Co., Brooklyn, N. Y.

LACQUER SPRAYERS (See Sprayers.)

LADLE HEATERS AND DRYERS

Monarch Engineering & Mfg. Co., Baltimore, Md.

LATHES (See also Polishing Lathes.)

Polishing

Cisco Machine Tool Co., The, Cincinnati, Ohio.

Metal spinning and Wood Turning

Pryibil, P., Machine Co., New York.

LEAD BURNING

Abernethy, John F., & Co., Inc., Brooklyn, N. Y.

LEAD-LINED TANKS (See Tanks.)

LEATHER POLISHING WHEELS (See Buffing and Polishing Wheels.)

LOCOMOTIVES, INDUSTRIAL (See Electric Locomotives.)

LUBRICANTS, Cutting and Grinding, Drawing, Stamping

International Chemical Co., Philadelphia, Pa.
Oakite Products, Inc., New York, N. Y.

MAGNETIC SEPARATORS (See also Reclaiming Machinery.)

Magnetic Mfg. Co., Milwaukee, Wis.

MANGANESE

Metal & Thermit Corp., New York.

MANGANESE-BRONZE (See Ingots.)

MANGANESE-COPPER (Also see Ingots.)

Ajax Metal Co., Philadelphia, Pa.
Metal & Thermit Corp., New York.
Niagara Falls Smtg. & Refg. Corp., Buffalo, N. Y.

MANTLE DIP

DuPont de Nemours, E. I., & Co., Wilmington, Del.
Nikolas, G. J., Co., Chicago, Ill.
Pittsburgh Lacquer and Chemical Co., Pittsburgh, Pa.
Zapon Co., The, New York, N. Y.

MELTING FURNACES (Also see Burners; Galvanizing and Tinning Furnaces; Tank Furnaces.)

Campbell-Hausefeld Co., Harrison, Ohio.

Coal and Coke

Monarch Engineering & Mfg. Co., Baltimore, Md.

Oil or Gas

Campbell-Hausfeld Co., Harrison, Ohio.
Johnson Gas Appliance Co., Cedar Rapids, Ia.
Monarch Engineering & Mfg. Co., Baltimore, Md.

Pit

Monarch Engineering & Mfg. Co., Baltimore, Md.
Stevens, Frederic B., Detroit, Mich.

Reverberatory

Monarch Engineering & Mfg. Co., Baltimore, Md.

METAL BRIQUETTES (See Briquet-Ingots.)

METAL CLEANERS (See also Cleaning Compounds.)

Cowles Detergent Co., Cleveland, Ohio.
Ford, J. B., Co., Wyandotte, Mich.
Fuller, W. A., Co., Greensburg, Pa.
Hanson & Van Winkle Co., Newark, N. J.
International Chemical Co., Philadelphia, Pa.
MacDermid, Inc., Waterbury, Conn.
Magnus Chemical Co., Brooklyn, N. Y.
Magnuson Products Corp., Brooklyn, N. Y.
Oakite Products, Inc., New York, N. Y.

METAL DEALERS (Also see Drosses, Residues, Etc., Buyers of; Turnings, Chips, Etc., Buyers of.)

Gold, Silver Platinum

Radnai, Josef, New York.
Roessler and Hasslacher Chemical Co., New York.

New Metals

Nassau Smelting & Refining Co., New York.
Trotter, Nathan, & Co., Philadelphia, Pa.

Old metals

Belmont Smelting & Refining Works, Inc., Brooklyn, N. Y.

Rare Metals

Radnai, Josef, New York.

METAL DRYERS, CENTRIFUGAL

Tolhurst Machine Works, Troy, N. Y.
No-Dust Drying Machine Co., Waterbury, Conn.

METAL GOODS MADE TO ORDER (Also see Stamping and Drawing.)

Kirk & Blum Mfg. Co., Cincinnati, Ohio
Scovill Mfg. Co., Waterbury, Conn.
Western Cartridge Co., East Alton, Ill.

METAL POLISH

Hanson & Van Winkle Co., Newark, N. J.
Lea Mfg. Co., Waterbury, Conn.
Matchless Metal Polish Co., Chicago, Ill.—Glen Ridge, N. J.

METAL RECLAIMING EQUIPMENT (See Concentrating Tables; Crushers and Pulverizers; Magnetic Separators.)

METAL SPECIALTIES

Kirk & Blum Mfg. Co., Cincinnati, Ohio.

METALS (See also Kinds Wanted. Also Metal Dealers.)

Acid Resistant

The Duriron Co., Dayton, Ohio.

Bearing

American Brass Co., Waterbury, Conn.

Extruded and Die Pressed

American Brass Co., Waterbury, Conn.

METALS, PLATED SHEET (See Plated and Polished Sheet Metals; Sheets.)

METALS, RARE (See Metal Dealers.)

METERS—ELECTRICAL MEASURING—

MILLS, CRUSHING (See also Crushers and Pulverizers.)

Hardinge Company, New York.

MOLD DRYERS, PORTABLE

Monarch Engineering & Mfg. Co., Baltimore, Md.

MOLDING MACHINES

Power

Turner Foundry & Machine Co., Phila., Pa.

MOLDING SAND (See Sand.)

MOLDINGS & EXTRUDED SHAPES

Aluminum

Aluminum Company of America, Pittsburgh, Pa.

MOLDS (See also Mold Makers.)

Babbitt and Solder

Fanning, J. P., Co., Brooklyn, N. Y.
Schweizer, Chas. K., St. Louis, Mo.

Ingot

Fanning, J. P., Co., Brooklyn, N. Y.
Farrel Foundry & Machine Co., Ansonia, Conn.
Schweizer, Chas. K., St. Louis, Mo.

MOLD SPRAYERS (See Sprayers.)

MOTOR CONTROL EQUIPMENT (See also Electrical Apparatus and Equipment.)

MOTORS (Also see Electrical Apparatus and Equipment.)

Electric

Chandeysson Electric Co., St. Louis, Mo.

MOTOR-GENERATOR SETS (Also see Dynamos; Electrical Apparatus and Equipment.)

Chandeysson Electric Co., St. Louis, Mo.
Crown Rheostat & Supply Co., Chicago, Ill.
Eager Electric Co., Watertown, N. Y.
Hanson & Van Winkle Co., Newark, N. J.
Ideal Electric Mfg. Co., Mansfield, Ohio.
Jantz & Leist Electric Co., Cincinnati, Ohio.
L'Hommedieu, Chas. F., & Sons Co., Chicago, Ill.
Munning, A. P., & Co., New York-Chicago.
Stutz, Geo. A., Mfg. Co., Chicago, Ill.

MOULD MAKERS

Adamac, F., New York.
Roettges, Fred, New York.

MUFFLES

Bartley, Jonathan, Crucible Co., Trenton, N. J.
Dixon, Joseph, Crucible Co., Jersey City, N. J.
Norton Co., Worcester, Mass.

MUNTZ METAL (See Sheets.)

NICKEL (See Anodes; Castings; Sheets; Wire; Etc.)

NICKEL, BORONIC

American Boron Products Co., Buffalo, N. Y.

NICKEL CARBONATE, MOIST AND DRY

Hanson & Van Winkle Co., Newark, N. J.
Harshaw, Fuller & Goodwin Co., Cleveland, Ohio.

NICKEL CHLORIDE

Hanson & Van Winkle Co., Newark, N. J.
Harshaw, Fuller & Goodwin Co., Clevelandfi Ohio.
Roessler & Hasslacher Chemical Co., New York, N. Y.

NICKEL SALTS

Apothecaries Hall Co., Waterbury, Conn.
Buchanan, Thos., Co., Cincinnati, Ohio.
Crown Rheostat & Supply Co., Chicago, Ill.
Daniels & Orben Co., New York.
Hanson & Van Winkle Co., Newark, N. J.
Harshaw, Fuller & Goodwin Co., Cleveland, Ohio
L'Hommedieu, Chas. F., & Sons Co., Chicago, Ill
MacDermid Incorporated, Waterbury, Conn.
Munning, A. P., & Co., New York-Chicago.
Roessler and Hasslacher Chemical Co., New York
Stevens, Frederic B., Detroit, Mich.

NICKEL SHOT

Seymour Mfg. Co., Seymour, Conn.

NICKEL SILVER (See also Brass, Sheets, Wire, Rod, Tube Castings; Forgings, Sheets; etc.)

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Sheets, Wire, Rod, Tube
American Brass Co., Waterbury, Conn.
Conklin, T. E., Brass & Copper Co., New York.
Scovill Mfg. Co., Waterbury, Conn.
Seymour Mfg. Co., Seymour, Conn.

NICKEL SULPHATE, SINGLE AND DOUBLE
Hanson & Van Winkle Co., Newark, N. J.
Harshaw, Fuller & Goodwin Co., Cleveland, Ohio.

OIL BURNERS (See Burners.)

OIL PUMPS (See also Oil Storage Systems.)
Monarch Engineering & Mfg. Co., Baltimore, Md.

OLD METALS (See Drosses, Residues, Etc., Buyers of; Metal Dealers.)

OVENS (Also see Burners; also Core Ovens.)

Enameling, Lacquering, Japaning
Kirk & Blum Mfg. Co., Cincinnati, Ohio.
Steiner, H. E., & Co., Newark, N. J.

OVEN BURNERS (See Burners.)

OVEN INSULATION (See Brick, Insulating; Insulating Cement; Insulation.)

OXIDIZING SOLUTIONS
Buchanan Chemical Co., C. G., Cincinnati, Ohio.
Sulphur Products Co., Greensburg, Pa.

PAINT SPRAYERS (See Sprayers.)

PARKERIZING
Parker Rust Proof Co., Detroit, Mich.

PATTERN SHOP EQUIPMENT (See Lathes; Saws.)

PAVING BRICK, CORK (See Brick.)

PHOSPHOR BRONZE (See also Ingots.)
Ajax Metal Co., Philadelphia, Pa.

PHOSPHORIZERS (See Graphite Products.)

PHOSPHOR-COPPER (Also see Ingots.)
Ajax Metal Co., Philadelphia, Pa.
Niagara Falls Smtg. & Rfg. Corp., Buffalo, N. Y.

PHOSPHOR-COPPER, BORONIC
American Boron Products Co., Buffalo, N. Y.

PHOSPHOR-TIN (See also Ingots.)
Ajax Metal Co., Philadelphia, Pa.

PHOSPHOR-TIN, BORONIC
American Boron Products Co., Buffalo, N. Y.

PHOSPHORUS
General Chemical Co., Philadelphia, Pa.

PICKLING COMPOUND (See Cleaning Compounds.)
Research Mfg. Co., Philadelphia, Pa.

PICKLING MACHINES, AUTOMATIC
No-Dust Drying Machine Co., Waterbury, Conn.
U. S. Galvanizing & Plating Equipment Corp., Brooklyn, N. Y.

PIPE ALUMINUM
Aluminum Company of America, Pittsburgh, Pa.

PIPE, BRASS AND COPPER
American Brass Co., Waterbury, Conn.
Scovill Mfg. Co., Waterbury, Conn.

PIPE AND BOILER COVERINGS, STEAM, ICE WATER, BRINE (See also Insulation.)
Armstrong Cork & Insulation Co., Pittsburgh, Pa.

PIPE AND FITTINGS

Acid Proof
Duriron, The, Co., Inc., Dayton, Ohio.

PISTON, RODS, TOBIN BRONZE
American Brass Co., Waterbury, Conn.

PLATED AND POLISHED SHEET METALS (See also Sheets.)
American Nickeloid Co., Peru, Ill.

PLATERS' BRUSHES (See Brushes.)
Chemical Treatment Co., New York.

PLATERS' BUCKETS, DIPPERS & PITCHERS
Belke Mfg. Co., Chicago, Ill.

PLATERS' COMPOUND (See Whale Oil Soap.)

PLATING

Chromium
Chromium Corp. of America, New York, N. Y.
Metals Protection Corp., Indianapolis, Ind.
Pyrene Mfg. Co., Newark, N. J.

PLATING BARRELS, ROTARY
Hanson & Van Winkle Co., Newark, N. J.
Lasalco, Inc., St. Louis, Mo.
Meaker, The, Co., Chicago, Ill.

PLATING AND GALVANIZING BARRELS
Connecticut Dynamo & Motor Co., Irvington, N. J.
Daniels & Orben Co., Inc., New York.
Hanson & Van Winkle Co., Newark, N. J.
L'Hommedieu, Chas. F., & Sons Co., Chicago, Ill.
Meaker, The, Co., Chicago, Ill.
Munning, A. P., & Co., New York-Chicago.
Stutz, Geo. A., Mfg. Co., Chicago, Ill.
U. S. Galvanizing & Plating Equipment Corp., Brooklyn, N. Y.

PLATING AND GALVANIZING MACHINES, AUTOMATIC (Also see Plating Barrels.)
Hanson & Van Winkle Co., Newark, N. J.
Lasalco, Inc., St. Louis, Mo.
Meaker, The, Co., Chicago, Ill.
U. S. Galvanizing & Plating Equipment Corp., Brooklyn, N. Y.

PLATING, BARREL METHOD, JOB AND CONTRACT (See Electroplating.)
Brunell Co., A. A., Worcester, Mass.
Pyrene Mfg. Co., Newark, N. J.

PLATING EQUIPMENT AND SUPPLIES (See also Kind Wanted.)
Daniels & Orben Co., Inc., New York, N. Y.
State Mfg. Co., Chicago, Ill.

PLATING GENERATORS
Hanson & Van Winkle Co., Newark, N. J.
Holland, J., & Sons, Brooklyn, N. Y.
Ideal Electric Mfg. Co., Mansfield, Ohio.
Lasalco, Inc., St. Louis, Mo.

PLATING MATERIALS
Meaker, The, Co., Chicago, Ill.

PLATING RACKS
Belke Mfg. Co., Chicago, Ill.

PLATING SOLUTION AGITATOR
Belke Mfg. Co., Chicago, Ill.

PLATING SOLUTION FILTER SYSTEM
Belke Mfg. Co., Chicago, Ill.

PLATING SOLUTION TESTERS
State Mfg. Co., Chicago, Ill.

PLATINUM (See Smelters and Refiners; Anodes; Bars; Metal Dealers; Sheets; Etc.)

PLATINUM BUFFING CAKE (See Buffing and Polishing Compositions.)

PLUMBAGO (See Graphite Products.)
Belke Mfg. Co., Chicago, Ill.

POLISHERS, FLOOR AND BENCH
Cisco Machine Tool Co., The, Cincinnati, Ohio.
Hill-Curtis Co., Kalamazoo, Mich.

POLISHING ABRASIVES
Abrasive Company, Bridesburg, Philadelphia, Pa.
Keystone Emery Mills, Philadelphia, Pa.
Zucker Sons Co., Inc., Elizabeth, N. J.

POLISHING COMPOSITION (See Buffing and Polishing Compositions.)
Lea Mfg. Co., The, Waterbury, Conn.
Zucker Sons Co., Inc., Elizabeth, N. J.

POLISHING DUST COLLECTING OUTFITS

Small
Leiman Bros., New York.

POLISHING EQUIPMENT AND SUPPLIES (See also Kinds Wanted.)
Cisco Machine Tool Co., The, Cincinnati, Ohio.
Hill-Curtis Co., Kalamazoo, Mich.

POLISHING FELTS
Eastern Felt Co., Winchester, Mass.

POLISHING HOODS (See Dust Collectors and Ventilating Systems; Hoods.)

POLISHING LATHES AND HEADS
Cisco Machine Tool Co., The, Cincinnati, Ohio.
Chandeysson Electric Co., St. Louis, Mo.
Cleveland Armature Wks., Cleveland, Ohio.
Crown Rheostat & Supply Co., Chicago, Ill.
Eager Electric Co., Watertown, N. Y.
Hanson & Van Winkle Co., Newark, N. J.
Hill-Curtis Co., Kalamazoo, Mich.
L'Hommedieu, Chas. F., & Sons Co., Chicago, Ill.
Munning, A. P., & Co., New York-Chicago.
Stutz, Geo. A., Mfg. Co., Chicago, Ill.

POLISHING MACHINES (Also see Polishing Lathes and Heads.)

Automatic
Acme Mfg. Co., Detroit, Mich.

POLISHING MATERIALS
Keystone Emery Mills, Philadelphia, Pa.
Zucker Sons Co., Inc., Elizabeth, N. J.

POLISHING MOTORS, ELECTRIC (See Polishing Lathes.)

POLISHING AND BURNISHING; JOB AND CONTRACT (See also Electro Plating.)
Brunell Co., A. A., Worcester, Mass.
Pyrene Mfg. Co., Newark, N. J.

POLISHING AND GRINDING ENGINEERS (See Engineers.)
Divine Bros. Co., Utica, N. Y.

POLISHING WHEELS (See Buffing and Polishing Wheels.)
Advance Wheel Mfg. Co., Chicago, Ill.
Divine Bros. Co., Utica, N. Y.
Dixon, Wm., Inc., Newark, N. J.

POTASH

First Sorts
International Chemical Co., Philadelphia, Pa.

Real
International Chemical Co., Philadelphia, Pa.

POTASSIUM CYANIDE
Hardy, Chas., Inc., New York.
Roessler & Hasslacher Chemical Co., New York

POWDERED METALS

Aluminum
Aluminum Company of America, Pittsburgh, Pa.

Bronze
Du Pont de Nemours, E. I., & Co., Wilmington, Del.

POWDERED COAL BURNERS (See Burners.)

PRESSES (Also see Scrap Baling Machine.)

Bench and Foot
Baird Machine Co., Bridgeport, Conn.
Shuster, F. B., Co., New Haven, Conn.

Cabbaging
Farrel Foundry & Machine Co., Ansonia, Conn.

Hydraulic
Watson-Stillman Co., New York.

Power, All Types
Baird Machine Co., Bridgeport, Conn.
Farrel Foundry & Machine Co., Ansonia, Conn.
Mackintosh-Hemphill Co., Pittsburgh, Pa.

PRESSES, DROP LIFTERS FOR
Miner & Peck Mfg. Co., Derby, Conn.

PRESSURE BLOWERS (See Blowers and Blow-Piping.)

PULVERIZERS
Standard Equipment Co., New Haven, Conn.

PUMPS

Centrifugal. Acid Proof
Duriron Co., The, Dayton, Ohio.

Reciprocating. Acid Proof
Duriron, The, Co., Inc., Dayton, Ohio.

PYROMETERS
Thwing Instrument Co., Philadelphia, Pa.

RARE METALS (See Metal Dealers.)

RECLAIMING MACHINERY, METAL (Also see Concentrating Tables; Crushers and Pulverizers; Magnetic Separators.)
Hardinge Company, New York.
Standard Equipment Co., New Haven, Conn.

BUYERS' GUIDE: ADVERTISERS' PRODUCTS

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RECORDING INSTRUMENTS
Thwing Instrument Co., Philadelphia, Pa.

RECORDING THERMOMETERS (See Thermometers.)

REFINERS AND SMELTERS (See Smelters and Refiners.)

REFRACTORY MATERIAL (Firesand)
Bartley, Jonathan, Crucible Co., Trenton, N. J.
Norton Co., Worcester, Mass.

REFRACTORIES
Bartley, Jonathan, Crucible Co., Trenton, N. J.
Norton Co., Worcester, Mass.

RETORTS, GRAPHITE
Bartley, Jonathan, Crucible Co., Trenton, N. J.
Dixon, Joseph, Crucible Co., Jersey City, N. J.
McCullough-Dalzell Crucible Co., Pittsburgh, Pa.
Plumbago Crucible Association, The, New York.

RHEOSTATS (See also Electrical Apparatus and Equipment.)
Connecticut Dynamo & Motor Co., Irvington, N. J.
Crown Rheostat & Supply Co., Chicago, Ill.
Daniels & Orben Co., New York.
Hanson & Van Winkle Co., Newark, N. J.
L'Hommedieu, Chas. F., & Sons Co., Chicago, Ill.

RIDDLES (See Foundry Riddles.)

RIVETS, NAILS & TACKS, ALL METALS
Hassall, John, Inc., Brooklyn, N. Y.

RODS AND BARS (Also see Brass Mill Products.)

Aluminum
Aluminum Company of America, Pittsburgh, Pa.
British Aluminum Co., Ltd., New York-Toronto, Can.
Strahs Aluminum Co., New York.

Brass, Bronze and Copper
American Brass Co., Waterbury, Conn.
Conklin, T. E., Brass & Copper Co., New York.
Standard Underground Cable Co., Pittsburgh, Pa.

ROLLING MILL MACHINERY (See also Draw Benches; Hydraulic Machinery; Presses; Rolls; Shears; Slitters.)
Farrel Foundry & Machine Co., Ansonia, Conn.
Yoder Co., The, Cleveland, Ohio.

ROLLS

Chilled and Sand Iron
Farrel Foundry & Machine Co., Ansonia, Conn.
Mackintosh-Hemphill Co., Pittsburgh, Pa.

Jewelers'
Leiman Bros., New York.
Mackintosh-Hemphill Co., Pittsburgh, Pa.

ROLLS AND COILS (See Sheets and Strip Metal.)

Brass, Copper and Bronze
Scovill Mfg. Co., Waterbury, Conn.

ROUGE (See Buffing and Polishing Compositions.)
Zucker Sons Co., Inc., Elizabeth, N. J.

RUST PREVENTATIVES
International Chemical Co., Philadelphia, Pa.
New Haven Sherardizing Co., Hartford, Conn.
Oakite Products, Inc., New York, N. Y.
Parker Rust Proof Co., Detroit, Mich.
Pyrene Mfg. Co., Newark, N. J.

RUST PROOFING PROCESS
New Haven Sherardizing Co., Hartford, Conn.
Parker Rust Proof Co., Detroit, Mich.
Pyrene Mfg. Co., Newark, N. J.

RUST REMOVERS
International Chemical Co., Philadelphia, Pa.
Pyrene Mfg. Co., Newark, N. J.

SAND

Molding

For Sand Blasting
Standard Equipment Co., New Haven, Conn.

SAND BLASTS

Accessories
Pangborn Corp., Hagerstown, Md.
Standard Equipment Co., New Haven, Conn.

Barrel
New Haven Sand Blast Co., New Haven, Conn.
Pangborn Corporation, Hagerstown, Md.
Standard Equipment Co., New Haven, Conn.

Cabinet
Astle, H. J., & Co., Providence, R. I.
Leiman Bros., New York.
Standard Equipment Co., New Haven, Conn.

Sand Blast Systems
New Haven Sand Blast Co., New Haven, Conn.
Pangborn Corp., Hagerstown, Md.
Standard Equipment Co., New Haven, Conn.

SAND BLASTS AND EQUIPMENT
Pangborn Corporation, Hagerstown, Md.
Standard Equipment Co., New Haven, Conn.

SAND SIFTERS
Malleable Iron Fittings Co., Branford, Conn.
Turner Foundry & Machine Co., Phila., Pa.

SAWDUST DRYING-OUT BOXES (Also see Drying-Out Machines.)
Smith-Richardson Co., Attleboro, Mass.

SAWDUSTLESS METAL DRYERS
Tolhurst Machine Co., Troy, N. Y.

SCRAP METAL DEALERS (See Drosses, Residues, Etc., Buyers of; Turnings, Chips, Etc., Buyers of; Metal Dealers.)

SCREW MACHINE PRODUCTS (Also see Machine Products.)
Economy Machine Products Co., Chicago, Ill.

SEPARATORS, MAGNETIC (See Magnetic Separators.)

SHEARS (See Slitters.)

SHEEPSKIN POLISHING WHEELS
Codman, F. L. & J. C., Co., So. Boston, Mass.
Hanson & Van Winkle Co., Newark, N. J.

SHEET FELT
Eastern Felt Co., Winchester, Mass.
Hanson & Van Winkle Co., Newark, N. J.

SHEET METAL PIPING FOR ALL PURPOSES
Kirk & Blum Mfg. Co., Cincinnati, Ohio.
No-Dust Drying Machine Co., Waterbury, Conn.

SHEET METAL SPECIALTIES
Kirk & Blum Mfg. Co., Cincinnati, Ohio.

SHEETS (Also see Brass Mill Products; Strip Metal.)

Aluminum
Aluminum Company of America, Pittsburgh, Pa.
British Aluminum Co., Ltd., New York-Toronto, Canada.
Strahs Aluminum Co., New York.

Brass, Copper and Bronze
Scovill Mfg. Co., Waterbury, Conn.

Brass, Copper and Nickel Silver
American Brass Co., Waterbury, Conn.
Bristol Brass Co., Bristol, Conn.
Conklin, T. E., Brass & Copper Co., New York.
Dallas Brass & Copper Co., Chicago, Ill.
New England Brass Co., Taunton, Mass.
Scovill Mfg. Co., Waterbury, Conn.
Seymour Mfg. Co., Seymour, Conn.
Western Cartridge Co., East Alton, Ill.

Bronze
Conklin, T. E., Brass & Copper Co., New York.
New England Brass Co., Taunton, Mass.

Copper
Conklin, T. E., Brass & Copper Co., New York.
Hussey, C. G., & Co., Pittsburgh, Pa.

Muntz's Metal
Taunton-New Bedford Copper Co., Taunton, Mass.

Nickel-Silver
New England Brass Co., Taunton, Mass.
Seymour Mfg. Co., Seymour, Conn.

Plated and Polished
American Nickeloid Co., Peru, Ill.

Platinum
Roessler & Hasslacher Chemical Co., New York.

Silver, Sterling
Handy & Harman, New York.
Jackson, John J., Co., Newark, N. J.

Zinc
Illinois Zinc Co., Peru, Ill.
Matthiesen & Hegeler Zinc Co., La Salle, Ill.

SHERARDIZING
New Haven Sherardizing Co., Hartford, Conn.

SHERARDIZING FURNACES AND EQUIPMENT
New Haven Sherardizing Co., Hartford, Conn.

SILICON COPPER
Ajax Metal Co., Philadelphia, Pa.
Niagara Falls Smtg. & Refg. Corp., Buffalo, N. Y.

Boronic
American Boron Products Co., Buffalo, N. Y.

SILVER (See Smelters and Refiners; Anodes Bars; Castings; Ingots; Metal Dealers; Sheets; Solder; Etc.)

SILVER, BORONIC
American Boron Products Co., Buffalo, N. Y.

SILVER CYANIDE
Roessler & Hasslacher Chemical Co., New York.

SLAB ZINC
Hegeler Zinc Co., Danville, Ill.
Illinois Zinc Co., Peru, Ill.
Matthiesen & Hegeler Zinc Co., La Salle, Ill.

SLAG CRUSHERS (See Crushers and Pulverizers.)

SLITTERS, SHEET METAL (See Shears.)

SMELTERS AND REFINERS (Also see Ingots.)

Copper-Bearing Material
Ajax Metal Co., Philadelphia, Pa.

Gold
Handy & Harman, New York.

Platinum
Roessler & Hasslacher Chemical Co., New York.

Silver
Handy & Harmon, New York.

White Metals
Michigan Smelting & Refining Co., Detroit, Mich.

SOAP AND SOAP CHIPS
American Tripoli Co., Seneca, Mo.
International Chemical Co., Philadelphia, Pa.

SODA ASH
Buchanan, The Thos., Co., Cincinnati, Ohio.

SODIUM CYANIDE
American Cyanamid Co., New York.
Daniels & Orben Co., New York.
Hanson & Van Winkle Co., Newark, N. J.
Hardy, Chas., Inc., New York.
L'Hommedieu, Chas. F., & Sons Co., Chicago, Ill.
Roessler & Hasslacher Chemical Co., New York.

SOLDER

Aluminum
Aluminum Company of America, Pittsburgh, Pa.

Tinners
Michigan Smelting & Refining Co., Detroit, Mich.

SOLDER MOLDS (See Molds.)

SOLDERING FLUX (See Fluxes.)

SOLUTION FILTER SYSTEM
Belke Mfg. Co., Chicago, Ill.

SOLUTIONS, OXIDIZING

Nickel
Buchanan Chemical Co., C. G., Cincinnati, Ohio.
Sulphur Products Co., Greensburg, Pa.

SOLVENTS
Anderson Chemical Co., New York.
Du Pont de Nemours, E. I., & Co., Wilmington, Del.
Egyptian Lacquer Mfg. Co., New York.
Maas & Waldstein Co., New York.
Miner Edgar Co., New York.
Pittsburgh Lacquer Co., Pittsburgh, Pa.
Zapon, The, Co., New York.
Zeller Lacquer Mfg. Co., New York.

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SPECIAL MACHINERY FOR NON-FERROUS MFG.
Torrington Mfg. Co., Torrington, Conn.
Yoder Co., Cleveland, Ohio.

SPECIALTIES, METAL (See Wire Specialties; Wire Shapers and Forms; Metal Goods Made to Order.)

SPELTER (See Slab Zinc; also see Ingots.)

SPELTER CHUCKS (See Chucks.)

SPINNING LATHES (See also Lathes.)
Pryibil, P., Machine Co., New York.

SPRAYERS
Foundry
De Vilbiss Mfg. Co., Toledo, Ohio.
Lacquer, Enamel, Japan, Paint
De Vilbiss Mfg. Co., Toledo, Ohio.
Economy Machine Products Co., Chicago, Ill.
Eureka Pneumatic Spray Co., Richmond Hill, N. Y.
Ideal Air Brush Mfg. Co., New York.

SPRAYING ACCESSORIES, HOODS, TABLES, ETC.
De Vilbiss Mfg. Co., Toledo, Ohio.
Ideal Air Brush Mfg. Co., New York.

SPRAYING EQUIPMENT, PORTABLE
De Vilbiss Mfg. Co., Toledo, Ohio.
Ideal Air Brush Mfg. Co., New York.

SPRUE CUTTERS (See also Saws.)
Turner Foundry & Machine Co., Phila., Pa.

STAMPING AND DRAWING, JOB AND CONTRACT (Also see Metal Goods Made to Order.)
Kirk & Blum Mfg. Co., Cincinnati, Ohio.
Scovill Mfg. Co., Waterbury, Conn.
Western Cartridge Co., East Alton, Ill.

STEAM SUPERHEATERS
Babcock & Wilcox Co., New York.

STEEL BALLS FOR BURNISHING BARRELS
Abbott Ball Co., Hartford, Conn.
Baird Machine Co., Bridgeport, Conn.
Beaver, H. Leroy, Co., Philadelphia, Pa.
Crown Rheostat & Supply Co., Chicago, Ill.
Hanson & Van Winkle Co., Newark, N. J.
No-Dust Drying Machine Co., Waterbury, Conn.
Smith-Richardson Co., Attleboro, Mass.

STEEL, BORONIC
American Boron Products Co., Buffalo, N. Y.

STIRRERS (See Graphic Products.)

STOKERS, CHAIN GRATE
Babcock & Wilcox Co., New York.

STONEWARE, ACID-PROOF (See Acid Pumps; Dipping Baskets.)

STRAIGHTENING, CUTTING AND FORMING MACHINERY (See Cutting, Straightening and Forming Machinery.)

STRIP METAL IN COILS AND ROLLS (Also see Brass Mill Products.)
Aluminum
Aluminum Company of America, Pittsburgh, Pa.
Brass, Copper and Nickel Silver
New England Brass Co., Taunton, Mass.

SULPHOCYANIDE OF SODA
Roessler & Hasslacher Chemical Co., New York.
Zapon Co., The, New York, N. Y.

SULPHUR, LIQUID
Sulphur Products Co., Greensburg, Pa.

SWEEP SMELTERS (See Smelters and Refiners.)

SWITCHBOARDS (See also Electrical Apparatus and Equipment.)

TANK FILTER
Belke Mfg. Co., Chicago, Ill.

TANKS
Lead Lined
Abernethy, John F., & Co., Inc., Brooklyn, N. Y.
Hanson & Van Winkle Co., Newark, N. J.
Steel
Hanson & Van Winkle Co., Newark, N. J.
Kirk & Blum Mfg. Co., Cincinnati, Ohio.
Stone
Hanson & Van Winkle Co., Newark, N. J.
Wood
Corcoran, A. J., & Co., Jersey City, N. J.
Hanson & Van Winkle Co., Newark, N. J.
Hauser Stander Tank Co., Cincinnati, Ohio.
Meaker, The, Co., Chicago, Ill.
Munning, A. P., & Co., New York-Chicago.
U. S. Galvanizing & Plating Equipment Corp., Brooklyn, N. Y.

TESTERS
Acid Solution
State Mfg. Co., Chicago, Ill.
Plating Solution
State Mfg. Co., Chicago, Ill.

TESTING LABORATORIES (See also Assayers and Chemists.)
Chemical
New York Testing Laboratories, New York.
Pitkin, Lucius, Inc., New York.

TILE
Refractory
Norton Co., Worcester, Mass.

TIN; PIG, BAR and BLOCK (See also Ingots, Tin.)

TINNING (See Electro-Plating, Hot Galvanizing and Tinning.)

TINNING AND RETINNING EQUIPMENT

TINNING FURNACES (See Galvanizing and Tinning Furnaces.)

TINNING FLUXES (See Fluxes.)

TOOL HARDENING FURNACES (See Heat Treating Furnaces.)

TRIPOLI COMPOSITION
Harshaw, Fuller & Goodwin Co., Philadelphia, Pa.

TRIPOLI, LUMP AND GROUND
American Tripoli Co., Seneca, Mo.

TUBE MILL MACHINERY
Torrington Mfg. Co., Torrington, Conn.

TUBES (Also see Aluminum and Brass Mill Products.)
Brass, Bronze and Copper
Aluminum Company of America, Pittsburgh, Pa.
American Brass Co., Waterbury, Conn.
Conklin, T. E., Brass & Copper Co., New York.
Standard Underground Cable Co., Pittsburgh, Pa.
Condenser
Scovill Mfg. Co., Waterbury, Conn.
Seamless Brass and Copper
Penn Brass & Copper Co., Inc., Erie, Pa.

TUMBLING BARRELS (Also see Burnishing and Polishing Barrels; Plating Barrels.)
All Kinds
Abbott Ball Co., Hartford, Conn.
Baird Machine Co., Bridgeport, Conn.
Globe Machine & Stamping Co., Cleveland, Ohio.
Hanson & Van Winkle Co., Newark, N. J.
Henderson Bros. Co., Waterbury, Conn.
L'Hommedieu, Chas. F., & Sons Co., Chicago, Ill.
Foundry
Baird Machine Co., Bridgeport, Conn.
Globe Machine & Stamping Co., Cleveland, Ohio.
Henderson Bros. Co., Waterbury, Conn.
Japanning
Baird Machine Co., Bridgeport, Conn.
Lacquering
Baird Machine Co., Bridgeport, Conn.
Oblique
Baird Machine Co., Bridgeport, Conn.
Hanson & Van Winkle Co., Newark, N. J.
Henderson Bros. Co., Waterbury, Conn.

TUNGSTEN
Metal & Thermit Corp., New York.

TURBINES, STEAM

TURNINGS, CHIPS, ETC., BUYERS OF (Also see Drosses, Residues, Etc., Buyers of; Metal Dealers.)

TYPE METAL (See Ingots.)

VACUUM PUMPS, ROTARY
Leiman Bros., New York.

VALVES AND FITTINGS
Belke Mfg. Co., Chicago, Ill.
Acid Proof
Duriron, The, Co., Inc., Dayton, Ohio.

VARNISHES FOR ALL PURPOSES
DuPont de Nemours, E. I., & Co., Wilmington, Del.
Hilo Varnish Corp., Brooklyn, N. Y.

VENTILATING SYSTEMS (See Blowers and Blow Piping; Dust Collectors and Ventilating Systems; Exhaust Fans and Heads.)

VIENNA LIME COMPOSITION
Harshaw, Fuller & Goodwin Co., Philadelphia, Pa

VIBRATORS
Campbell-Hausfeld Co., Harrison, Ohio.
Malleable Iron Fittings Co., Branford, Conn.
Springless
Malleable Iron Fittings Co., Branford, Conn.

VOLTMETERS (Also see Electrical Apparatus and Equipment.)
Connecticut Dynamo & Motor Co., Irvington, N. J.
Daniels & Orben Co., New York.
Hanson & Van Winkle Co., Newark, N. J.

WASHING MACHINES, Metal Parts
No-Dust Drying Machine Co., Waterbury, Conn

WASTE CLEANER AND OIL RECLAIMER
International Chemical Co., Philadelphia, Pa.
Oakite Products, Inc., New York, N. Y.

WELDING APPARATUS

WEIGHERS AND SAMPLERS
Pitkin, Lucius, Inc., New York.

WHALE OIL SOAP (Also see Cleaning Compounds; Fig Cleansers.)
Daniels & Orben Co., New York.
Hanson & Van Winkle Co., Newark, N. J.
International Chemical Co., Philadelphia, Pa.

WHEELS, POLISHING
Advance Wheel Mfg. Co., Chicago, Ill.

WHITE METALS (See also Smelters and Refiners; Babbitt Metal; Ingots; Ets.)
Ajax Metal Co., Philadelphia, Pa.

WHITE POLISH
Harshaw, Fuller, & Goodwin Co., Philadelphia, Pa.

WIRE
Aluminum
Aluminum Company of America, Pittsburgh, Pa.
British Aluminum Co., Ltd., New York-Toronto, Canada.
Brass, Bronze, Copper and Nickel-Silver, Etc.
American Brass Co., Waterbury, Conn.
Conklin, T. E., Brass & Copper Co., New York

WIRE FORMING MACHINERY (See also Cutting, Straightening and Forming Machinery.)
Baird Machine Co., Bridgeport, Conn.

WIRE MILL PRODUCTS (See also Brass Mill Products; Wire.)
Farrel Foundry & Machine Co., Ansonia, Conn

WIRE STRAIGHTENING AND CUTTING MACHINERY (See Cutting, Straightening and Forming Machinery.)
Shuster Co., The F. B., New Haven, Conn.

WIRE WHEEL BRUSHES (See Brushes.)

WIRING DEVICES (See Electrical Apparatus and Equipment.)

WOOD ENAMELS (See Enamels.)

WOOD LACQUERS (See Lacquers.)

WOODFILLERS, PASTE
DuPont de Nemours, E. I., & Co., Wilmington, Del.
Hilo Varnish Corp., Brooklyn, N. Y.

YELLOW BRASS (See Sheets, Munts Metal.)

ZINC (See Slab Zinc; Smelters and Refined Anodes; Sheets; Strip Metal, Etc.)
Smith & McCrorken, Brooklyn, N. Y.

ZINC CYANIDE
American Cyanamid Co., New York.
Hardy, Chas., Inc., New York.
Roessler & Hasslacher Chemical Co., New York

ZINC DUST
Grasselli Chemical Co., Cleveland, Ohio.

ZINC ELECTROLYTIC
United Metals Selling Co., New York.

ZINC PLATING (See Electro-Galvanizing.)

ZINC PRODUCTS

ZINC, ROLLED (Also see Sheets, Zinc.)
Platt Bros. & Co., Waterbury, Conn.

ZINC SALTS, COMMERCIAL
Meaker, The, Co., Chicago, Ill.
U. S. Galvanizing and Plating Equipment Co., Brooklyn, N. Y.

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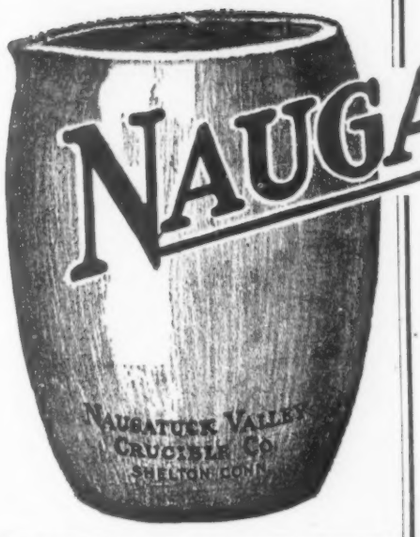

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